Tanganyika Territory

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Annual Reports

OF THE

PRINCIPAL MEDICAL OFFICER

AND THE

SENIOR SANITARY OFFICER

November 1918 to November 1920

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Report

OF THE

Principal Medical Officer

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Report of the Principal Medical Officer

November 1918 to November 1920

THE ESTABLISHMENT OF A CIVIL MEDICAL SERVICE

THE formation of a Civil Medical Staff commenced with the arrival at Tanga, on 10th March, 1917, of Dr. A. E. Horn, of the W.A.M.S., as temporary Senior Medical Officer, a title subsequently changed to that of Principal Medical Officer. Dr. Horn established his headquarters at Tanga, and set to work to organise a Medical Department under very great difficulties. The medical buildings and equipment belonging to the late German Government were in the hands of the military authorities, who still had need of them. Dr. Keigwin, who arrived on 30th May, 1917, instituted sanitary work at Tanga, and Dr. T. H. Suffern, who arrived on 2nd July, 1917, was posted to Pangani; both these officials were seconded from the W.A.M.S.

Dr. W. A. Lamborn, of the Imperial Bureau of Entomology, arrived at Tanga on 2nd July, 1917, and opened a dispensary for the benefit of the civil officials and population in Tanga.

After protracted negotiations with the military authorities, Tanga Hospital was taken over on 25th April, 1918, and Dr. Lamborn placed in charge until the arrival, on 3rd August, 1918, of Dr. C. L. Ievers, of the W.A.M.S.; Dr. Lamborn then proceeded on a tour up the north-east parts of the country, and later to the south-east, where he made valuable reports upon Leprosy and the distribution of Tsetse fly. With Dr. Ievers, arrived Dr. G. H. Gallagher, who was despatched to Mwanza, which was taken over from the Military on 3rd January, 1919.

Nursing Sisters Philips and O'Sullivan reached Tanga in January, 1918, and Nursing Sisters Simmonds, Banks and Plant in April, 1918, so that a full nursing service was available for Tanga Hospital from the date of taking over; in the matter of obtaining native staff, however, considerable difficulty was experienced. Numbers of military patients continued to receive treatment at Tanga Hospital after its transfer.

Medical charge of Arusha and Moshi was taken over in May and July, 1918, by Drs. J. M. Clark, W.A.M.S., and C. R. H. Tichborne, released from military service; and of Bukoba, in August, 1918, by Dr. C. R. Wallace. The records show that great efforts to obtain medical staff, by release from military service or otherwise, were made during 1917 and 1918; Dr. W. V. Tothill was released by the Military in August, 1918, and relieved Dr. Keigwin of the duties of Medical Officer of Health, Tanga. The release from military service of Dr. R. P. Mitchell was also obtained in 1918, and he took over Morogoro.

By the end of 1918, therefore, a medical service for the Civil Administration in the northern parts of the Territory had been formed. Major H. S. Stannus, of Nyasaland, had meanwhile established a fairly complete medical service, with Medical Officers at New Langenburg, Bismarkburg and Mahenge, in the south-west area. Major Stannus, who was appointed Senior Medical Officer, New Langenburg, on 1st July, 1917, was able to present an annual report for 1917–18, showing much useful work accomplished; when invalided in June, 1918, he was replaced, temporarily, by Captain King, I.M.S. A report of Plague in Iringa district during July, 1918, lead to some discussion as to the desirability of that district being administered, from a medical point of view, from Tanga rather than from New Langenburg; fortunately, the military medical authorities, who investigated the epidemic, decided that the diagnosis of Plague could not be upheld. It is worthy of remark that the Germans at one time considered Plague to be endemic near Iringa. Subsequently, the two medical services were amalgamated.

A severe blow befell the newly-created department in January, 1919, when the complete breakdown of Dr. Horn's health necessitated his being invalided home. Dr. Keigwin, who had acted as his deputy for many months, was called upon to take his place temporarily, and shortly afterwards, Dr. Bailey, of the W.A.M.S., was sent out by the Colonial Office to replace Dr. Horn ; his sad death some seven days after landing at Dar-es-Salaam, whither Medical Headquarters were transferred in February, 1919, made it necessary for Dr. Keigwin to again assume the duties of Principal Medical Officer.

During 1919, the services of other Medical Officers, who had already experience of the country in a military capacity, were obtained on a temporary contract. Dr. Logan was stationed at Lindi, Dr. Crawford at New Langenburg, in succession to Captain King, I.M.S., Dr. Reid at Kilwa, Dr. Wilson at Iringa, and Dr. R. R. Scott was appointed assistant to Dr. Lamborn, who had now returned from his tour in the south-west area and taken over the duties of Medical Officer of Health, Dar-es-Salaam. Dr. Lamborn soon afterwards left the service and proceeded to Nyasaland. The services of Captain Fisher, who had been on military service, were secured as Government Dentist in April, 1919, a most useful addition to the staff.

The European hospital, Dar-es-Salaam, was transferred to the civil authorities in April, 1919, and Dr. Crichton, of the W.A.M.S., who had arrived from home in February, took charge ; the Sewa Hadji hospital was handed over by the military authorities in February, 1919, and Dr. J. H. Parry, who had been on military service, was appointed Medical Officer. The work of the European hospital, Dar-es-Salaam, was carried on under great difficulties at the outset, owing to lack of nursing staff; Miss Kemsley arrived in May, and was appointed Sister-in-charge, and with the assistance of Mrs. Cartlidge and the two Misses Fichat, rendered untiring service until reinforcements arrived. Although the hospital was now civil, many military patients were admitted to the wards. Dr. Mitchell was transferred from Morogoro to assist Dr. Crichton, but succumbed to heart disease in November, 1919. Dr. Blackwood, released from military service, relieved Dr. Mitchell at Morogoro, and Dr. Langton, who had been on military service in Nyasaland, arrived in October to replace Dr. Mitchell, but his services were soon required for Mwanza, and for nearly a year Dr. Ievers has been single-handed at the European hospital, Dar-es-Salaam. Dr. Suffern was transferred from Pangani to take over Tabora in March, 1919.

In December, 1919, when the writer arrived from England to take over the duties of Principal Medical Officer, there was, therefore, a temporary staff sufficient to meet more immediate requirements; Dr. J. O. Shircore, transferred from British East Africa, also arrived in December, 1919, as Deputy Principal Medical Officer, and Dr. Keigwin was released to proceed on home leave in January, 1920, on the expiry of which he reverted to the W.A.M.S.

Difficulties, however, loomed ahead, for excepting the Principal Medical Officer and the Deputy Principal Medical Officer, there was no permanent medical staff, and the Medical Officers released by the Military, were on contracts which were to expire early in 1920. They had, for the most part, already served for a tour of more than the usual length, and were in need of and anxious to obtain home leave. They were, moreover, unwilling to accept appointments in a service for which the terms were provisional only; some desired to take further courses of instruction or complete those curtailed by a response to the national needs. Eight of the staff of Medical Officers left the country in the early months of 1920, with the result that, for many weeks, the staff of Medical Officers on duty was reduced to nine (including one Medical Officer of Health), and only seven stations in the whole country had a Medical Officer; the difficulty of securing Sub-Assistant Surgeons as substitutes, made the situation the more unfavourable, and it is, I think, greatly to the credit of the population, both official and unofficial, that very few complaints or unreasonable demands for medical assistance were received; many persons, including women, were living quite remote from any possible medical help beyond that of a native dresser or an Indian Compounder.

Lieut.-Col. Skelton, R.A.M.C., arrived in March, 1920, as Senior Sanitation Officer, but soon found himself under the necessity of acting as Medical Officer of Health, Dar-es-Salaam, in addition to his proper duties; a dual position which he has now cheerfully occupied for nearly four months. Another welcome addition to the staff was the appointment of Dr. G. G. Butler, as Director of Laboratory; Dr. Butler was transferred from Sierra Leone and arrived at Dar-es-Salaam in March, 1920—a summary of his work is attached; until his arrival, Mr. Hammond, who had gained some experience in Laboratory work on military service in East Africa, carried on the routine work of the Laboratory.

Dr. R. Y. Stones, of the Church Missionary Society, accepted a temporary appointment as Medical Officer, Dodoma, in our emergency, and the services of Dr. Haworth, from Rhodesia, were secured in June, 1920, the latter taking over the duties of Medical Officer of Health, Tanga.

Dr. McNaughton's arrival in July, 1920, allowed Dr. Suffern, of Tabora, to go on leave, for which he was overdue. Dr. Van Derwert arrived in Dar-es-Salaam at the end of August, 1920, and, with the return of Drs. Parry and Wilson from leave, it was possible to allow Drs. Gallagher and D. S. Scott to proceed home.

At the time of writing, Medical Officers are stationed at Dar-es-Salaam, European and Sewa Hadji hospitals, Tanga, Moshi, Arusha, Mwanza, Morogoro, Dodoma, Tabora and Tukuyu (New Langenburg), and there will shortly be one on Lake Tanganyika; in addition, there is a Medical Officer of Health at Tanga, and Colonel Skelton is acting as Medical Officer of Health, Dar-es-Salaam. Indian Sub-Assistant Surgeons are acting as Medical Officers at Bukoba, Pangani, Bagamoyo, Kilwa, Lindi, Kondoa-Irangi, Iringa and Mahenge, elsewhere Compounders are in charge.

It is expected that the nursing staff will shortly be up to full strength. A Medical Storekeeper, Mr. Dovey, has been appointed to fill the vacancy caused by the expiration of Mr. Watson's temporary contract, and five permanent and one temporary Sanitary Superintendents have been appointed.

During 1920, the Principal Medical Officer and Deputy Principal Medical Officer have made tours of inspection to Lindi and Kilwa; to Tanga, Lushoto (Wilhelmstal), Moshi, the lunatic asylum at Lutindi, and to the old German Sanatorium at Vugiri; to Morogoro, Dodoma and Tabora; to Iringa; to Moshi and Arusha

In May, owing to temporary absence on much needed local leave of the Medical Officer in charge European Hospital, Dar-es-Salaam, the Principal Medical Officer acted in that capacity for a fortnight.

During the present year forms for the various Medical returns and reports have been introduced, and are now in use; it is not yet possible to make any complete return of the work of the various hospitals and medical units in the country up to date for, until the new forms came into use, no regular standardised returns were received at the Principal Medical Officer's office. Since their introduction, moreover, several medical posts have been in charge of subordinates unable to render complete returns. On the few Medical Officers in the country has fallen a very large amount of clerical work, in connection with Medical Boards on officials and for re-assessment of pensions, in addition to their ordinary duties; this has been more particularly the case in Dar-es-Salaam, and a generous response has been given by both Medical Officers and Nursing Sisters to the many calls upon them.

HOSPITALS AND OTHER MEDICAL BUILDINGS

We have inherited from the Germans some medical buildings which compare favourably with any in Tropical Africa. The European Hospital, Dar-es-Salaam, is capable of accommodating 50 beds easily: by making use of verandahs many more beds were in use during the war. It has a number of single and two-bedded wards, separate maternity section, well fitted X-ray room and photographic dark room, dark room for the examination of eye cases, spacious operation theatre, out-patient department and quarters for the nursing staff and Medical Officer. It faces the Indian Ocean and receives the benefit of the sea breezes. It is lighted by electricity from the main town supply.

Adjoining it are the Bacteriological Institute, Dispensary, Mortuary Chapel, Laundry, etc. The whole forms a unit standing in its own grounds. The sanitary arrangements are not up to modern ideas, a criticism which may be applied generally to the Territory.

At the other end of the town, near the Gerezani Creek, is the Sewa Hadji hospital for Indians and Natives, a curious rambling collection of buildings of which the administrative block is the outstanding feature. Its capacity is also about 50 beds, a number which is insufficient for the needs of a native town with a population estimated at twenty or twenty-five thousand, as well as for the K.A.R. garrison, civil police, prisoners, railway and other Government native and Indian employees. The general native population does not, however, as yet patronise it largely.

Tanga European Hospital is constructed on somewhat similar lines to that of Dar-es-Salaam, but is smaller and does not possess such valuable accessories. It is on a fine site some half-mile outside the township, overlooking the harbour. The native and Indian Hospital is situated in the same block of land and comprises four blocks capable of holding about 60 beds. The other hospitals in the Territory are more modest in design: Tabora has a hospital capable of holding 22 beds for Europeans and Goanese and a native hospital holding 75 beds; Lindi, a building in which four or five European cases could be received; Kilwa has no hospital accommodation for Europeans, but a small hospital for Indians and natives; Arusha, a hospital of three wards capable of holding six beds for Europeans, and there are twelve beds for natives; Mwanza a small European hospital. There is no hospital at New Moshi, at

THE EUROPEAN HOSPITAL, DAR-ES-SALAAM

present the Land Bank buildings are used for the purpose. There are no European hospitals at Iringa, Morogoro or Dodoma, permanent native hospitals exist at the two former places.

At Vugiri, a beautiful spot in the Usambara Mountains, is a very complete Sanatorium with a fine "Kurhaus"; sanction to re-open this has been obtained. It is nearly 4,000 feet above the sea and some 12 miles by road from Korogwe on the Tanga-Moshi line. The climate is delightful.

The only lunatic asylum is at Lutindi, about 8 miles by road from Maurui on the Tanga-Moshi line. Here are housed some 80 native lunatics, in cramped quarters; it was managed by the neighbouring mission. Its inaccessible site detracts very seriously from its usefulness. An asylum on the Central Railway is an urgent necessity. The institution at Lutindi may continue for the present to serve the needs of the northern parts of the country.

LEPROSY

Leprosy is widely distributed throughout the Territory, and the Germans were endeavouring to arrange for the isolation of all lepers in the period closely preceding the outbreak of war. Their estimates for 1914 showed 4,164 cases in segregation camps. In some districts the camps were only then being completed and were not yet occupied. Tukuyu (New Langenburg) and Morogoro furnished the largest numbers, 1,640 and 1,000 respectively. There were said to be many cases at large in some districts. During the war, owing to lack of supervision and the proximity of hostilities, many of the leper settlements were deserted, the inmates returning to their villages. The District Political Officers have lately been collecting and segregating the lepers and there are now 3,082 in segregation camps. It is estimated that there are 2,500 more at large, but the returns are not complete and probably this is an under estimate. The problem is a large one; it is proposed to concentrate the segregation camps as far as possible in order to ensure better supervision and control of the inmates.

For those parts of the country generally from which returns have been received, it is found that the incidence is 1 leper in every 589 of the population. In India, at the 1911 census, there was found to be 1 leper in every 2,888 of the population. The most heavily infected districts in the Tanganyika Territory are Morogoro, 1 leper in 155 of the population; Tukuyu (New Langenburg), 1 in 221; Songea, 1 in 288, and Mahenge, 1 in 253; the lightest incidence being in Tanga, 1 in 2,403, and Moshi and Arusha, 1 in 2,393. Complete returns have not been received for Lindi and Kasanga (Bismarkburg) districts. The accompanying map brings out these points more clearly.* It should be mentioned that the population of districts is derived from German sources and refers to 1910; it has probably been considerably reduced in some districts by the war. The estimate of the number of lepers is one made during this year.

SLEEPING SICKNESS

There are three areas in which this disease occurs in the Tanganyika Territory:—

(*a*) The Victoria Nyanza region.

(*b*) The Lake Tanganyika region.

(*c*) The Southern area in the neighbourhood of the Rovuma River and its tributaries.

Through the kindness of the Official Translator, who has gone through a number of German records, it is possible to obtain an idea of the position as observed by the Germans.

(*a*) THE VICTORIA NYANZA REGION.—*Glossina palpalis* was found along the greater part of the lake shore and upon the adjoining islands, excepting on the west side of the lake, for about 40 miles south of the British border.

On the eastern side of the lake, the banks of the Mori River were considered the chief centre of infection and police posts were formed on the Mara River, a few miles south, to restrict movements. A concentration camp for Sleeping Sickness cases was established at Utegi on the right bank of the Mori River.

In 1911 all the lake shore north of the Mara River and the greater part of the infected banks of the Mori River had been cleared ; work was in progress south of the Mara on the lake shore and on the Mori. The situation was considered to be well in hand. On the western side and southern end a "closed area" was formed including portions of the mainland of and the islands in Emin Pasha Gulf. Outside this area clearing operations had been carried out and were being continued in 1911. The frontier north of Bukoba was closed. There were two concentration camps in which 700 cases of Sleeping Sickness were interned. The total of new cases on the Victoria Nyanza was reported to have been reduced from 1,405 in 1908-9 to 27 in 1912-13.

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* Not reproduced.

(*b*) THE TANGANYIKA REGION.—*Glossina palpalis* was reported on almost the entire eastern shore of the lake and for some distance up the Mlagarasi, Rugufu and Luegere Rivers ; the Congo was considered the chief source of infection. By clearing, a stretch of a few miles of lake shore, including Kigoma and Ujiji, had been freed of *Glossina palpalis* and three smaller areas, at important places on the lake shore further south, also been made fly free.

The worst part of the Mlagarasi River had been cleared. Three camps for isolation of cases were opened at Ujiji, Niansa and Usumbura ; these places are in the Territory occupied by the Belgians.

A return in 1911 mentioned 1,672 slight and 802 severe cases of Sleeping Sickness on Lake Tanganyika ; of the latter 268 had died. In 1912-13 there were said to be 3,303 cases under observation. It was stated that many years of laborious effort would be required to exclude the possibility of new infections arising on the lake. The most heavily infected areas now lie within the Belgian sphere.

(*c*) THE SOUTHERN AREA.—Dr. Beck's expedition in 1911 reported that Sleeping Sickness was endemic on the entire upper course of the Rovuma River ; infection was traced to Portuguese Territory with which there was incessant native traffic. Dr. Beck stated in 1913 that 50,000 natives had migrated from Portuguese Territory in the past five years to settle in Lindi and Songea Districts. He remarks, obviously in view of the dictum of the Royal Society's Commission—no *Glossina palpalis*, no Sleeping Sickness—that nowhere in the southern area is *Glossina palpalis* found to exist. The discovery of cases of Sleeping Sickness in the Luangwa Valley, North Eastern Rhodesia, had, however, already caused Sir David Bruce to be less dogmatic on this point. It was not long before Kinghorn and Yorke clearly demonstrated that such an opinion was untenable. Dr. Beck remarks that *G. morsitans* was widespread.

The first cases were found at Jumbe Mtira's village at the junction of the Sassaware River with the Rovuma; in three of the seven cases the disease was believed to have been contracted locally.

The expedition proceeded up the Rovuma to the point where the Mtsinji River joins it, finding cases at several villages; cases were also found at Kiwindi on Lake Nyasa and near Songea. The cases were removed to Songea, and later to Nyangwere where an isolation camp was formed. In 1911-12 20 cases were discovered and in 1912-13 50 more.

Dr. Beck found *G. morsitans* all along the Rovuma from the Sassaware junction up to the hills bordering on Lake Nyasa and inland to within four hours of Songea; also on the Ruhudje and Pitu Rivers north-east of Songea. Further investigations were made along the whole extent of the shores of Lake Nyasa from the British border at the Songwe River down to the Portuguese border but no case, other than the one at Kiwindi, was found. In Lindi District 43 cases were found in the triangle formed by lines connecting Mtarika and Kutukulu on the Rovuma with Guaya on the Mbessa Stream; these were isolated at a camp formed at Sassaware.

The absence of *Glossina palpalis* is repeatedly remarked, and Dr. Beck and Professor Steudal express the opinion that infection is caused by *G. morsitans*. Game is considered to be a negligible factor in regard to the disease in Songea District. Clearing of bush and forest without other measures is reported to be insufficient to destroy *G. morsitans*.

Dr. Beck made a further expedition in 1915 and found a centre of infection at Rupinda on the Likondo River. Transmission experiments were made with *Ornithodorns moubata ;* they were unsuccessful.

Taute's experiments, supporting Kleine's opinion that the trypanosome, probably *T. brucei*, found in the wild game, is not identical with the human *T. rhodesiense*, were carried out during the war and a translation of his paper has appeared in the Bulletin of the Tropical Diseases Bureau ; they afford strong evidence against the conclusion of the Kinghorn-Yorke and Royal Society's Commissions that these trypanosomes are identical and may well give pause to the advocates of extermination of wild game. If *T. rhodesiense* be a purely human trypanosome the prospects of stamping out the form of Sleeping Sickness due to it are encouraging.

THE PRESENT POSITION

No case of human trypanosomiasis of either form has been found by the civil staff. The position at the present time is not very clear. Dr. Lamborn investigated the lower section of the Rovuma in December, 1918, without finding any cases. He found *G. morsitans* but not in large numbers. Investigation of the whole length of the Rovuma is necessary. Dr. Lamborn's investigation is the only special work on the subject which it has been possible for the small civil medical staff to carry out ; it was cut short by heavy rain.

On the Victoria Nyanza and Lake Tanganyika the German precautions are being observed as far as possible ; clearings are maintained at landing places ; natives arriving at Mwanza by steamer or dhow are examined ; restrictions are placed upon fishing in dangerous areas ; persons are not allowed to settle upon the fly-infested islands on the Victoria Nyanza ; the native chiefs are warned to report any cases resembling Sleeping Sickness. As soon as possible, organised investigations must be carried out. The German medical staff engaged on purely Sleeping Sickness duties is said to have been nine Medical Officers and sixteen Non-Commissioned Officers.

Principal Medical Officer.

RETURN OF DISEASES (IN AND OUT-PATIENTS, ALL CASES) TREATED APRIL TO SEPTEMBER, 1920, INCLUSIVE, AT THE FOLLOWING HOSPITALS

Dar-es-Salaam European Hospital, Tanga, Tabora, Moshi, Lindi, Mwanza, Kondoa-Irangi, Rufiji, Wilhelmstal, and Bagamoyo

Diseases	Total	Deaths
Infective Diseases—		
Beri-Beri	1	—
Cerebro-Spinal Fever	8	5
Chicken-pox	68	—
Cholera	—	—
Dengue	—	—
Diphtheria	—	—
Dysentery	179	2
Endocarditis (infective)	—	—
Enteric Fever	10	—
Erysipelas	1	1
Gonorrhoea	275	—
Influenza	38	—
Kala Azar	—	—
Leprosy (*a*) Nodular	—	—
,, (*b*) Anæsthetic	3	—
Malaria (*a*) Tertian	5,614	3
,, (*b*) Quartan		
,, (*c*) Aestivo-Autumnal ...		
,, (*d*) Chronic Malaria	136	—
,, (*e*) Blackwater	27	8
Measles	7	—
Malta Fever	—	—
Plague	—	—
Carried forward	6,367	19

RETURN OF DISEASES TREATED—*continued*

DISEASES	TOTAL	DEATHS
Brought forward	6,367	19
INFECTIVE DISEASES—*continued.*		
Pneumonia	92	13
Rabies	—	—
Relapsing Fever	11	—
Rheumatic Fever	235	—
Septicæmia	1	1
Trypanosomiasis (Sleeping Sickness)	—	—
Small-pox	82	10
Syphilis (*a*) Primary	173	—
,, (*b*) Secondary	280	2
,, (*c*) Inherited	18	—
Tetanus	2	1
Tuberculosis	32	5
Whooping Cough	140	—
Yaws	216	—
Yellow Fever	—	—
Pyrexia of uncertain origin	113	—
INTOXICATIONS—		
Alcoholism	7	—
Morphinism	2	—
Others	—	—
GENERAL DISEASES	304	1
LOCAL DISEASES—		
Nervous Diseases :—		
Sub-Section 1	54	—
Sub-Section 2	410	2
Sub-Section 3	16	1
Carried forward	8,555	55

RETURN OF DISEASES TREATED—*continued*

DISEASES	TOTAL	DEATHS
Brought forward	8,555	55
DISEASES OF THE EYE	494	—
DISEASES OF THE EAR	217	—
DISEASES OF THE NOSE	6	—
DISEASES, CIRCULATORY SYSTEM	31	2
DISEASES, RESPIRATORY SYSTEM	3,082	4
DISEASES OF THE DIGESTIVE SYSTEM ...	4,322	11
DISEASES OF THE LYMPHATIC SYSTEM ...	188	—
DISEASES OF THE URINARY SYSTEM ...	106	—
DISEASES OF THE GENERATIVE SYSTEM—		
Male	276	1
Female	70	—
DISEASES OF THE ORGANS OF LOCOMOTION	256	1
DISEASES OF THE CONNECTIVE TISSUE ...	2,660	5
DISEASES OF THE SKIN	3,212	—
INJURIES	2,323	3
TUMOURS	30	1
MALFORMATIONS	1	—
POISONS—		
Snakebite	5	—
PARASITES—ANIMAL	1	—
PROTOZOA	3	—
TREMATODA (Flukes)	2	—
CESTODA—		
Tænia Solium	—	—
Tænia Saginata	9	—
NEMATODA	1,043	12
INSECTA	5	—
TOTAL	26,897	95
SURGICAL OPERATIONS	62	—

THE FOLLOWING TABLE SHOWS THE NUMBER OF EUROPEAN GOVERNMENT OFFICIALS INVALIDED IN THE YEARS 1917–1920, WITH CAUSE OF INVALIDING

	DISEASES	1917	1918	1919	1920 (to end of October)	TOTAL
1.	General Debility...	—	1	3	3	7
2.	Anæmia	1	1	—	1	3
3.	Malaria	—	—	2	2	4
4.	Blackwater Fever	—	—	2	2	4
5.	Relapsing (Tick) Fever	—	—	1	—	1
6.	Chronic Amœbic Dysentery	—	—	—	1	1
7.	Pulmonary Tuberculosis	—	—	1	1	2
8.	Meningitis	—	—	—	1	1
9.	Neurasthenia	—	2	3	4	9
10.	Insomnia	—	—	—	1	1
11.	Loss of Vision	—	—	1	—	1
12.	Chronic Osteo Myelitis...	—	—	1	—	1
13.	Divided Tendon...	—	—	—	1	1
14.	Bullet Wound of Foot	—	—	—	1	1
15.	Valvular Disease of Heart	—	—	—	1	1
16.	Epididymitis	—	—	—	1	1
17.	Perinœal Fistulæ	—	—	—	1	1
		1	4	14	21	40

THE FOLLOWING TABLE SHOWS THE NUMBER OF ASIATIC GOVERNMENT OFFICIALS INVALIDED IN THE YEARS 1917–1920, WITH CAUSE OF INVALIDING

DISEASES	1917	1918	1919	1920 (to Oct. 31st)	TOTAL
1. Malaria	—	—	4	4	8
2. Blackwater Fever	—	1	4	5	10
3. Tuberculosis	—	—	2	2	4
4. Syphilis	—	—	—	2	2
5. General Debility	—	—	2	4	6
6. Chronic Rheumatism	—	—	—	1	1
7. Anæmia	—	—	1	3	4
8. Dyspepsia	—	—	1	—	1
9. Fistula	—	—	—	1	1
10. Hepatitis	—	—	—	1	1
11. Acute Nephritis	—	—	—	1	1
12. Cystitis	—	—	—	1	1
13. Chronic Bronchitis	—	—	1	1	2
14. Neurasthenia	—	—	—	1	1
15. Loss of Vision	—	—	—	1	1
16. Insanity	—	—	—	1	1
17. Unknown	—	—	1	1	2
	—	1	16	30	47

TABLE SHOWING DEATHS OF EUROPEAN GOVERNMENT OFFICIALS DURING 1918–1920

	1918	1919	1920 (to Oct. 31st)	Total
Blackwater	—	—	4	4
Cerebral Malaria	—	—	1	1
Diabetic Coma	1	—	—	1
Sunstroke	—	1	—	1
Heart Failure	—	4	—	4
Suicide ; temporarily insane ...	—	1	—	1
	1	6	5	12

TABLE SHOWING DEATHS OF ASIATIC GOVERNMENT OFFICIALS DURING 1919–20

	1919	1920 (to Oct. 31st)	Total
Blackwater	—	8	8
Meningitis	—	1	1
Heart Disease	1	—	1
	1	9	10

REPORT ON THE BACTERIOLOGICAL LABORATORY

The Civil Administration took over the Laboratory on March 1st, 1919. Serjt. Hammond, who had been attached to the Laboratory during its military days, continued on duty, and has remained as Laboratory Assistant. Though the civil authorities took over the Laboratory on the above date many Military remained for two months, and all examinations made for them have been included in the following results. In March, 1920, I was appointed in charge of the Laboratory, and Laboratory work has been steadily carried out.

A good deal of re-organisation has been necessary, and in particular does this apply to the production of calf lymph.

The conditions of the stables and the general facilities for calf lymph production was so insanitary that it was thought wise to alter the calf sheds, and it is hoped that shortly the lymph produced will more than cover the cost of the alterations.

Several batches of Laboratory animals have been obtained, but it has been with the greatest difficulty that Wassermann reactions have been carried on until the breeding rate will keep us regularly supplied with all we need.

Stock cultures have been obtained from home and South Africa to replace those that had died out, and until we can make our own agglutinating and hæmolytic sera a regular supply of these from home has been ordered.

Very little in the way of research has been possible at present, but possibilities will occur as material becomes more abundant.

A good many preliminary observations have been made on the diastatic activity in the urine and blood of tropical diseases.

Search has been made in rats as a possible carrier of enteric group organisms, and though a good many *B. Gœrtner* organisms have been encountered, it is not clear that they have any significance.

No case of carriers of the spirochæte of ictero-hæmorrhagic jaundice has yet been found in rats, but only a few have been examined with this in view.

I proceed to give an account of the chief routine examinations that have been carried out.

BLOOD EXAMINATIONS FOR PARASITES

From March 1st, 1919, to February, 1920, inclusive ; total of 809.

From March 1st, 1920, to October, 1920, inclusive ; total of 543.

Making a Grand Total of 1,352.

Benign tertian, subtertian and quartan parasites have been found, as well as spirilla of relapsing fever. No trypanosomes have been found.

The type of parasites chiefly found is now the subtertian variety —a curious change from the military days, when benign tertian seemed to be commoner, and may be explained by the presence of Indian troops during that period.

WASSERMANN'S REACTION

The original Wassermann technique is now being carried out.

From March 1st, 1919, to February, 1920, inclusive ; total of 93.

From March 1st, 1920, to October, 1920, inclusive ; total of 81.

Making a Grand Total of 174.

The antigen has been made locally, but the hæmolytic serum is obtained from home.

The guinea pigs have bred in rather a poor fashion, and they are distinctly poor in complement, which may be the result of in-breeding and requires investigation.

BLOOD CULTURES

This has been chiefly carried out for the enteric group.

From March 1st, 1919, to February, 1920, inclusive; total of 8.

From March 1st, 1920, to October, 1920, inclusive ; total of 21.

Making a Grand Total of 29.

During this period one case of paratyphoid and four cases of *B. Typhosus* have been found.

EXAMINATION OF FÆCES

(*a*) MICROSCOPICAL

From March 1st, 1919, to February, 1920, inclusive ; total of 36.

From March 1st, 1920, to October, 1920, inclusive ; total of 89.

Making a Grand Total of 125.

Amœbae and their cysts, ova of the different intestinal worms, and Bilharzia ova have all been frequently found.

(*b*) BACTERIOLOGICAL EXAMINATIONS

From March 1st, 1919, to February, 1920, inclusive ; total of 19.
From March 1st, 1920, to October, 1920, inclusive ; total of 21.
Making a Grand Total of 40.

During these investigations on 13 occasions *B. Dysenteriæ* have been found, and 3 cases of *B. Typhosus.*

URINE EXAMINATIONS

Either general examinations or for Bilharzia have been done on 22 cases during year ending 1920, and 29 cases since then. Urinary Bilharzia appears fairly common.

EXAMINATIONS FOR AGGLUTINATING REACTION

Only six have been done, and in only one of which was a diagnostic result obtained.

EXAMINATION OF SPUTA

From March 1st, 1919, to February, 1920, inclusive ; total of 37.
From March 1st, 1920, to October, 1920, inclusive ; total of 47.
Making a Grand Total of 84.

These have been chiefly for Tubercle bacilli, and a good many positive cases have been found.

EXAMINATION OF PUS

From March 1st, 1919, to February, 1920, inclusive ; total of 58.
From March 1st, 1920, to October, 1920, inclusive ; total of 66.
Making a Grand Total of 124.

Urethral pus, conjunctival pus, abscess material, etc., have been the chief sources.

No case of Plague has been found.

A series of slides from an alleged Plague outbreak in the Singidda District were examined and found negative, as did a culture obtained from the same source. One case of Climatic Bubo revealed a Plague-like organism, which, however, proved non-pathogenic to guinea pigs.

SCRAPINGS FROM ULCERS

This has been chiefly performed in the search for Leprosy and *Spirochæte Pallida.*

Five cases have been carried out during the first year from March, 1919, to February, 1920, inclusive, and eight since then.

VACCINES

There has not been a great demand for these, four only having been made since March, 1919, and all for *Staphylococci*.

However, about 800 ccs. of Plague vaccine have been prepared.

MISCELLANEOUS

This covers a widely different series of cases.

(*a*) CEREBRO-SPINAL FLUID.—On six occasions. No case of Cerebro-Spinal Meningitis has been found, though *Pneumococcus* and *Staphylococcal* infections have.

(*b*) TUMOURS AND PATHOLOGICAL MATERIAL have been sectioned on four occasions, malignant disease being found on two occasions.

(*c*) MEDICO LEGAL.—A series of implements and two clothes have been examined for blood stains, and two samples of food for suspected poisons.

(*d*) CALF LYMPH PRODUCTION.—Owing to alterations required in the stables this has been seriously delayed, but I am glad to be able to report that a beginning has at last been made, a seed lymph from Bombay being used as a start, and the first issue should take place before the end of November.

(*e*) EXAMINATION OF RATS.—Close on 2,500 rats have been examined for Plague since April, 1920, and no case has been found. The examination has been supplemented by bacteriological methods in a good many cases.

(*f*) WATER ANALYSIS.—Eight samples have been examined bacteriologically, with uniformly unsatisfactory results.

Four samples have been examined chemically.

(*g*) FOODS AND BEVERAGES.—One sample of milk has been examined which proved very satisfactory chemically, but was bacteriologically very dirty.

Several samples of Spirits have been examined for their Alcohol content at the request of the Customs Department.

(*h*) VETERINARY.—Six slides for Anthrax have been examined, all proving negative.

One slide of East Coast Fever was sent.

SPECIMENS EXAMINED BOTH MICROSCOPICALLY AND BACTERIOLOGICALLY FROM MARCH 1st, 1919, TO OCTOBER, 1920, INCLUSIVE

Blood Examinations for parasites	Total	1,352
Wassermann reactions	,,	174
Blood cultures	,,	29
Examination of fæces—Microscopical ...	,,	125
Examination of fæces—Bacteriological ...	,,	40
Urine examinations	,,	51
Examinations for agglutinating reaction ...	,,	6
Examinations of sputa	,,	84
Examinations of pus	,,	124
Examinations of scrapings from ulcers ...	,,	13
Vaccines prepared	,,	4
Examinations of specimens—Miscellaneous ...	,,	33
Examinations of rats	,,	2,500

G. G. BUTLER.

DENTAL REPORT, 1919–20

Below is a brief summary of the dental treatment completed during the period April, 1919–October 1920.

	Tanganyika Territory	Zanzibar
Attendances	856	77
Fillings	442	43
Pulp treatment	49	5
Extractions	326	17
Sealings, etc.	89	18
Repairs to dentures	47	3
Dentures	42	—

Zanzibar was visited twice at the request of the Zanzibar Government, and the above treatment carried out.

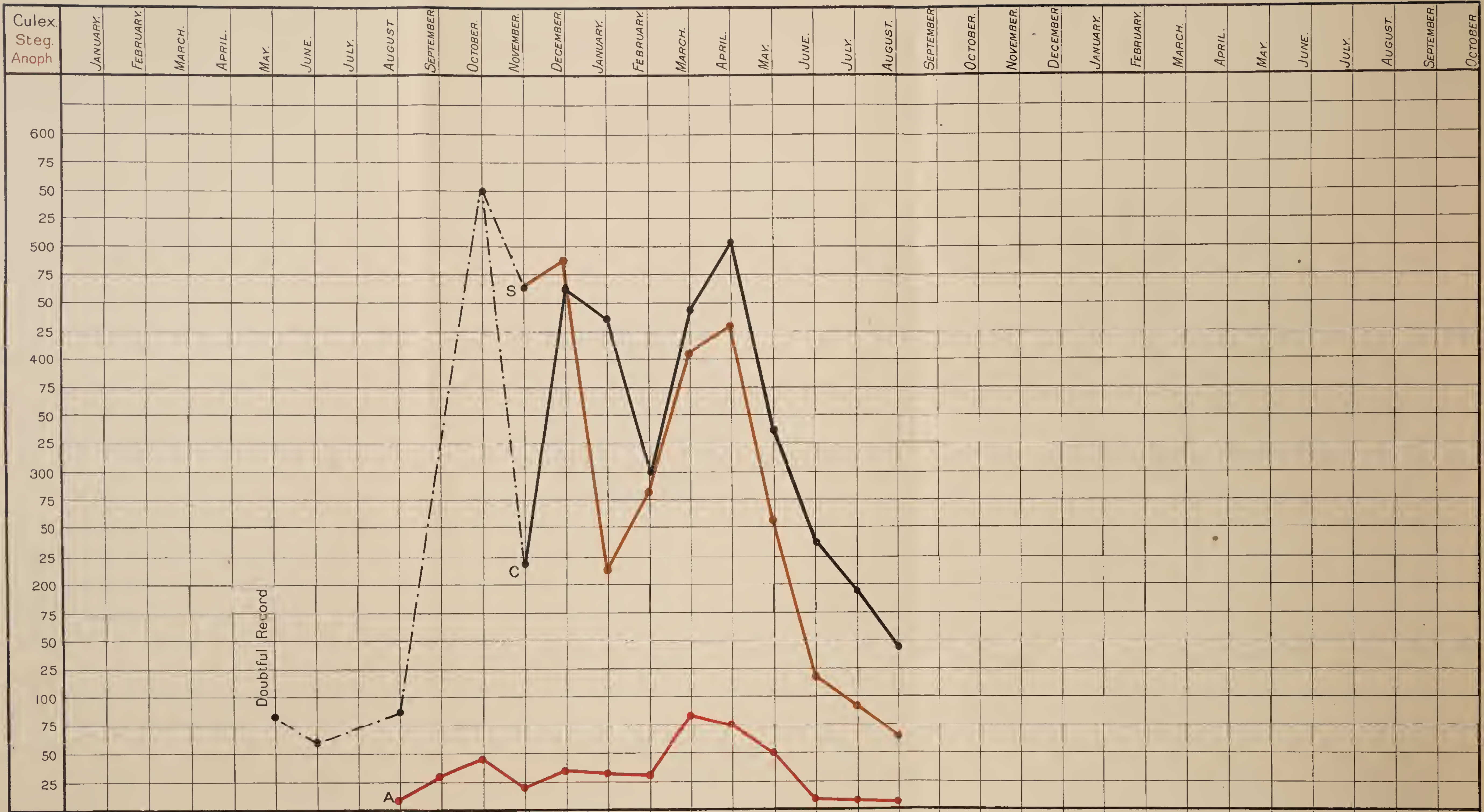
The following stations were visited in the Territory:—

Station.	Visits.
Moshi	2
Tanga	3
Arusha	1
Wilhelmstal	1
Tabora	1

In addition to the above a number of natives, chiefly in the Government employ, have been treated.

H. M. FISHER,
Government Dentist.

MOSQUITO DAR-ES-SALAAM. CHART



	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.
M.R.fall.	·	·	·	6·72	6·14	·041	2·15	·85	·48	2·70	3·045	1·47	3·05	·05	·144	4·28	6·77	1·11	·08	4·20	0·12													
M.Temp.	·	·	·	·	·	·	·	·	·	·	·	·	28·01	28·67	28·58	26·86	25·35	·	24·01	24·09	23·58													

←- - - - - - 1919 - - - - - -→←- - - - - - 1920 - - - - - -→←- - - - - - 1921 - - - - - -→

Report

OF THE

Senior Sanitary Officer

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* Not reproduced.

Sanitation Report, Tanganyika Territory

November 1918 to November 1920

INTRODUCTION

This report covers the period from the date of the armistice in 1918, until 1st November, 1920.

An attempt has been made to describe, as shortly as possible, the activities of the Sanitation Branch of the Medical Department during that period.

In character the report may not have been written on conventional lines. An excuse for this variation is to be found in the fact that the usual figures, which may be expected in a Sanitary Report, are actually not available. The Branch is as yet in its infancy, at any rate as far as its work in the interior of the Territory is concerned. No vital statistics worth quoting are available. There is no reliable information as to the population, nor as to the number of births or deaths, even in the township areas. We know practically nothing about the infantile mortality rate, beyond the fact that it is high; according to some figures supplied by the District Political Officer, Moshi, as high as 30 per cent. and this appalling figure is probably fairly accurate. No section of this report therefore is concerned with vital statistics.

Again, no figures have been attempted that deal with the prevalence and mortality rate of such diseases as Tuberculosis, Leprosy, Sleeping Sickness, and Venereal Disease, as these have been ruled as not being within the sphere of action of the Sanitation Branch.

The Report is divided into four sections:—

Section I.	General.
Section II.	Urban Sanitation.
Section III.	Rural Sanitation.
Section IV.	Maps* and Chart.

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* Not reproduced.

SECTION I

GENERAL

1. SPHERES OF ACTION OF SANITATION BRANCH

On the 24th June, 1920, the Principal Medical Officer defined the spheres of action of the Sanitation Branch of the Medical Department. He decided that the Senior Sanitation Officer should, in the first instance (A) receive reports and initiate necessary action in cases of small-pox, plague, cholera, yellow fever, chicken-pox, whooping cough, mumps, influenza, measles, German measles, scarlet fever, cerebro-spinal meningitis, and in epidemics of enteric fever and dysentery in all parts of the country. (B) That the preventive aspects of malaria, enteric fever, tick fever, anchylostomiasis, and anthrax should be the concern of the Sanitation Branch. (C) That there should be a central sanitation store for sanitary equipment, implements, tools, etc. (D) That the primary responsibility for the proper spending of monies allocated to certain items should rest with the Senior Sanitation Officer. In the 1920–21 estimates these items included :—

(*a*) The Clerical Staff for the Sanitation Department.
(*b*) Native Sanitary Inspectors.
(*c*) Sanitary labour.
(*d*) Upkeep of infectious disease hospital and quarantine station.
(*e*) Epidemic outbreaks and special sanitary measures.
(*f*) Sanitary equipment.
(*g*) Disinfectants and oils.
(*h*) Uniform of sanitary Inspectors.

2. STAFF

The Senior Sanitation Officer arrived on first appointment on 18th March, 1920. The existing Sanitation staff in the Territory at that date consisted of :—

Medical Officers of Health	2
European Sanitary Superintendents ...	5
Native Sanitary Inspectors	18
Sanitary labourers	741

The two Health Officers were stationed at Dar-es-Salaam and Tanga, respectively. Of the general labour personnel, Dar-es-Salaam absorbed 253, Tanga 64, and Tabora 68.

3. FINANCE

The funds allotted in the estimates for 1920–21 to the Sanitation Branch under the Medical Department amounted approximately to 23 per cent. of the vote and to 1·4 per cent. of the total expenditure of the Territory.

4. LEGAL

The administration of Public Health in this Territory depends on the following legal powers :—

1. Special sections of the Indian Penal Code.
2. Proclamation No. 15 of 1917.—Registration of Births and Deaths.
3. Rules for the township of Dar-es-Salaam. 1st November, 1919.—Nos. 4, 14, 16 (c), (g), (h), 35, 37, 38, 39, 40, 41, 43, 44, 45, 47, 48, 49, 59 (d), 57.

These rules cover the suppression of nuisances ; the care of dairies, cowsheds, milkshops, bakeries and butcheries, the control of the sale of milk and meat, the protection of the public from infectious diseases, the suppression of mosquitoes and so on.

4. Proclamation No. 5 of 1920.—Diseases of animals.
5. Proclamation No. 9 of 1920, paras. 3, 4, and 5.—Port health.
6. Imports and Exports Restriction Proclamation, 1920. Section 2, para. 9 of the notice.—Anthrax from shaving brushes.
7. Sanitary Rules for the township of Dar-es-Salaam, September, 1920. (Govt. Notice No. 59.)
8. Government Notice No. 60.—Quarantine arrangements with Zanzibar.
9. Ordinance No. 3 of 1920.—Infectious diseases.

SECTION II

URBAN SANITATION

DAR-ES-SALAAM TOWNSHIP.

1. PROGRESS IN SANITARY ADMINISTRATION

The Sanitation of the capital did not come under civil charge until a much later date than at Tanga. Dr. Lamborn assumed full duties of Civil Medical Officer of Health on 9th February, 1919, but two European Sanitary Superintendents had been appointed as from 1st February. At that time the greater part of the township was still occupied by the Military. By the beginning of March most of the Sanitation staff had been collected. Dr. R. R. Scott was appointed Assistant Medical Officer of Health on the 24th March. Six native Africans were engaged to be trained as Sanitary Inspectors. The number of labourers employed was 130, of whom 24 were employed exclusively on anti-mosquito work. Dr. Lamborn on assuming duty reported that the task before him was no light one. The rains were just about to begin. The sanitation of the town latterly had been much neglected by the Military. The street drains were all blocked and soon got full up. Cess pits were broken in and generally imperfectly covered. There were holes in the roads ; roof gutterings were choked up, taps and drains were everywhere leaking. Indians and natives alike were indifferent to sanitation. There was a plague of mosquitoes and flies and accumulations of rubbish everywhere. Dr. Lamborn refers to the condition of affairs as being like an " Augean stable." Nevertheless, he and Dr. Scott set to work to clean it up and within a few months worked a wonderful change. The first thing to do, obviously, was to tidy up the place and remove the rubbish, and the next, systematically to set to work to put insanitary conditions to rights. Dr. Lamborn doubted if the sanitation of the native town had ever been seriously attempted during the military occupation.

In the middle of May, 1919, all military sanitary labour was withdrawn and at the same time the Port medical work devolved to the Civil Administration.

2. DIVISION OF THE DUTIES OF THE HEALTH OFFICE

The duties now carried out by the Health Office may be divided into two main heads : those connected with the Port of Dar-es-Salaam, and those connected with the town.

(A) Port Medical Officer's Duties

The Port duties may be disposed of comparatively quickly ; they are not onerous at present, and the appointment of a Sub-Assistant Surgeon has much reduced the tedious visiting of the small coasting steamers which previously had to be done by the Medical Officer.

The Port work is further lessened by the fact that ships from India, and also the majority of those calling at Mombasa, have already passed through Zanzibar before reaching Dar-es-Salaam ; such sanitary measures as may be found necessary have therefore generally been put into practice by the time the ships reach the latter port.

(*a*) *Quarantine.*—Again, an arrangement has been arrived at between the Tanganyika Administration and the Zanzibar Government, whereby " infected " or " suspected " ships arriving at Dar-es-Salaam may be sent over to Zanzibar for quarantine and disinfection in case of necessity.

The establishment of an efficient quarantine station on our Quarantine Island would be a costly and a difficult undertaking. In the first place, a landing there can only be effected with any degree of comfort or safety at slack water, whilst the difficulty of disembarking a stretcher case without some sort of jetty is almost insuperable.

Secondly, a steam disinfecting plant would have to be erected (the conveyance of a Thresh to the island other than in small pieces would be a physical impossibility). The maintenance of such a plant, which in the moist salt air of the island would rapidly deteriorate, would be a further charge, while the improvement of the existing buildings and water supply, and maintenance of equipment and grounds, so as to be ready for use at a moment's notice would be an expensive matter.

When one considers the infrequency with which we may presume the station is likely to be called into use, the expense referred to hardly seems justifiable in view of the present shortage of staff and other infinitely more important works, to which available funds might be diverted with greater profit to the Territory.

(*b*) *Disinfection of Ships.*—The Clayton Gas Disinfecting Plant necessary would cost a large additional sum to put in order ; the whole of the bottom of the iron barge would probably have to be renewed in the first place, and an engineer would have to be maintained to keep it in order and available for use at any time. Our two small portable Clayton machines would not be of any use for steamers larger than say, the " Lord Milner."

(*c*) *Ships Cleared.*—A monthly average of eleven steamers was cleared from the port during the past fourteen months. This number may confidently be expected to increase.

The inspection of incoming dhows is now carried out twice daily ; the monthly average for the past six months being forty-one.

(*d*) *Water Transport.*—With regard to the Port Medical Officer's transport ; the " Molly," the Red Cross gift boat, has never been in use since its presentation, owing to the unfortunate accident which it sustained in May, 1919. It is an expensive and clumsy boat to use for work in the inner harbour and it is recommended that the boat be sold or exchanged for a smaller and more useful vessel.

The present arrangement whereby the Medical Officer has had the use of the Port Officer's motor boat and rowing boat whenever required, has worked fairly satisfactorily hitherto. But it is quite easy to conceive of circumstances in which the arrangement might be anything but satisfactory. Moreover, the saving of the Port Medical Officer's time by his being independent of another officer's courtesy would, in the aggregate, be considerable. A small fast boat will be more useful to the Port Medical Officer than the " Molly " is ever likely to be, and it is possible that such a boat could be got were the necessary authority and sanction of the Red Cross Society for the exchange obtained.

(*e*) *Inter-Communication of Health Officers.* — The importance of close touch being maintained between the various Port Health Authorities up and down the coast is to be emphasised. There should be mutual weekly exchange of information relating to infectious diseases between the ports concerned, and the freest confidence established between Medical Officers in the common endeavour to restrict the spread of preventable disease.

In this connection it is recommended that the nationality of cases of infectious disease be stated in returns rather than bare figures. This gives the receiving Medical Officer valuable information among which community a similar outbreak may be expected.

(B) MUNICIPAL DUTIES

The duties of the Medical Officer of Health in the town cannot be disposed of so quickly. They form the bulk of the work, and if efficiently carried out afford ample scope for two whole-time Medical Officers.

This fact is reiterated in the hope that in the happy future time when sufficient Medical Officers will be available, a request for an Assistant Medical Officer of Health may not be considered a new idea, or one to be dismissed or laid aside for future consideration.

The duties as carried out in the town at the present date may be divided as follows :—

(*a*) *Normal Municipal Services*, including :—

Disposal of refuse.

Inspection and part maintenance of drainage system.

Inspection of water supply and prevention of contamination.

Supervision of food supply, including markets, meat and milk.

(*b*) *Special Services.*

Control of preventable diseases, including reduction of mosquitoes and rats, vaccinations, certification of lepers, and upkeep of Infectious disease hospital.

Control of cemeteries.

Registration of deaths.

Control of laundries.

Transport of sick.

(*c*) *Miscellaneous Duties.*

Keeping of meteorological records.

Training of Native Sanitary Inspectors.

(*d*) *Attendance on Committees.*
Building.
Housing.
Licensing.

(*e*) *Town Improvement.*
Including upkeep of shade trees, hedges and public gardens.

While the above summarises the duties as performed at the time of writing, it must not be assumed that these duties are carried out in as efficient a manner as they should be.

The past year has been largely taken up by spade work, "getting things going" in other words, and in a young community such as that in which we live we cannot hope to achieve efficiency during such a short time. As things settle down, however, the Medical Officer may, by relegating the details of the work to an efficient subordinate staff, be able to devote more time to the broader questions of Public Health and Town Improvement than has been possible hitherto.

Many of the duties mentioned in the above list, far from being efficiently carried out, are in reality only superficially touched upon, and it is sincerely hoped that this lack of thoroughness, unavoidable at present owing to the shortage of experienced staff, may be remedied in the near future, and that our town may not only appear healthy by comparison with others, but be really healthy and become a prosperous business centre, by the growth of an efficient health organisation and the elimination of eyewash.

3. REVIEW OF WORK PERFORMED

At this point a short resumé of the work of the period under review may be given. It may help to realise how much there is to be carried out in a town of the size of Dar-es-Salaam.

1st Half-Year (*March-July*, *1919*).—These months were occupied in endeavouring to "cleanse the Augean stable."

During the first two months of the year, the evacuation of the town by the Military was gradually being commenced; and with the knowledge of the town's impending desertion by those concerned with its upkeep, a falling off occurred in that strict attention, which had previously been paid to sanitary matters.

During the most important months of the year therefore, when preparations for the coming wet season should have been pushed ahead, matters were allowed to slide somewhat, in spite of the best endeavours of those still remaining, and the state of the town when it came definitely under civil control in March was deplorable. Deserted, or almost deserted camps (the latter worse from our point of view) existed everywhere. Every camp meant derelict iron latrines (incinerator system), soakage pits, and in most cases water tanks ; and the state into which these got as the sweepers were gradually withdrawn is indescribable.

Shortage of skilled staff was the greatest drawback; it had taken 40 Europeans to supervise the native sanitary labour during the full military occupation. This number was suddenly cut down to two superintendents, and had their sterling qualities not made up for lack of numbers, the service would inevitably have broken down under such a strain. Six untrained, unskilled, partially educated natives took the place of the other Europeans and it was expected that they would in time be able to carry out the duties which still remained to be performed during the last months of evacuation, and permanently during civil occupation.

At this time the lack of understanding and co-operation between civil and military medical Authorities was to be deplored, since much valuable information and advice regarding the town was lost thereby.

The shortage of maps of the town, and complete lack of drainage plans, or of records of previous work, either military or pre-war, and also of a register of houses, further increased the difficulties of the work.

The non-provision of a clerk, although such a man was provided for in the estimates, threw additional petty details of routine work on to the Medical Officers and Superintendents, while the delay in obtaining equipment, more especially refuse carts and oxen, did not tend to improve the situation.

This period may be said to have ended in the mild outbreak of small-pox which occurred early in July. This, however, is an annual occurrence after the rains, according to report.

On urgent representations being made, an additional European Superintendent was attached to the office as a temporary measure, and an African clerk was appointed. Mention should be made of the re-appointment of Mr. d'Souza, as Inspector in charge of anti-mosquito work, together with an increase of sixty-five labourers in the middle of May. This was due to the urgent representations of Dr. Spurrier, of Zanzibar, who was well acquainted from previous experience with the town's requirements in that direction.

These additions made an immediate improvement in the town, and many of the members of the old mosquito brigade who had been well trained in military days, returned to work under their old master.

August, September, October, 1919.—The following three months, August, September, and October, saw considerable improvements taking place, and results began to be manifest. The military camps were fast disappearing, the rains were over, drains were getting cleared up, swamps being drained or drying up, with a consequent reduction in the number of mosquitoes and malaria; bush and grass were being cut and the starting of the new refuse dump at Chafukoga in May was fast reducing the number of flies.

The salutary effect of the prosecutions instituted with the consequent heavy fines, was being felt in the Indian bazaar, where some improvements in the condition of the backyards could be noticed.

The Native Sanitary Inspectors were beginning to learn their work, and the Medical Officer of Health was beginning to know something of the town, and of the spots in which to look for trouble.

The appointment of a clerk, though he was young and inexperienced, much reduced the indoor work of the European Officers, and allowed of more attention being paid to outdoor matters.

A report on new works required in the township for the coming financial year was drawn up.

November, December, 1919.—These months were marked by no occurrence of importance; a rainfall of $3\frac{1}{2}$ inches helped to raise the mosquito incidence.

Constructive drainage work was pushed on in the Mchikichini and Bagamoyo pool areas so as to be prepared as far as possible for the rains.

1st Half-Year, 1920.—Little worthy of comment occurred during the first half of 1920.

Three inches of rain fell in January, and 12 inches between April and June; the rains being delayed and smaller than the average.

The total rainfall from the 1st June, 1919, to 31st May, 1920, was 25·63 inches, instead of the 40 inches to be expected according to German records.

But such rain as did fall was sufficient to justify previous views regarding the important part played by road pools in the dissemination of Anopheline mosquitoes. This was referred to by Dr. Lamborn in his Sanitary Report for April, 1919, and again at some length in the Sanitary Report for April, 1920. The importance of the thorough repair of all metalled roads in the township, and the provision of storm water drainage cannot be sufficiently emphasised. In this connection the road known as Prolonged Leue Street and Caravan Street may be especially mentioned.

4. STAFF

Dr. Scott proceeded on leave in July, 1920, and the Executive Health work for the town devolved on the Senior Sanitation Officer in addition to his other duties.

This arrangement is not one which is recommended to be repeated. There is already more work than one officer solely detailed for Health duties in Dar-es-Salaam can conveniently get through. If the post of Senior Sanitation Officer is to be justified, then he cannot continue the two duties without neglecting one or the other. The Senior Sanitation Officer should be free to proceed at any moment to any point where the danger of epidemic disease threatens, to organise and advise preventive measures. Distances in this Territory are so great, local conditions so diverse, that it is absurd to expect him to direct measures from headquarters. On the economic future of this great country depend many factors, among them being the preservation of health of the population in mass and the prevention of the spread of epidemic disease.

Apart from that, multitudinous questions arise in regard to important sanitation matters which demand, in addition to expert sanitary knowledge, information as to local conditions. If the Senior Sanitation Officer is tied down to working as an Executive Health Officer in the capital, he cannot possibly be expected even to give an opinion which is worth having on matters arising in distant provinces. In short, the arrangement whereby the Senior Sanitation Officer is expected to act as Deputy to an Executive Health Officer, is as bad in practice as it is in principle. He must be either one or the other, but he cannot be both.

An additional Medical Officer for the Sanitation Branch is needed.

SANITARY SUPERINTENDENTS.—Both these officials have their hands full at present. If the various working parties distributed throughout the town are to be kept "to it," it is essential for them to be visited constantly, otherwise Government money is expended uselessly.

Endeavour has been made as far as possible, to keep the old headmen who have been employed at the Health Office, in some cases for four years, but the African is difficult to imbue with a sense of responsibility, and must be supervised.

In addition to such supervision, the reporting of sanitary defects, checking Native Inspectors' books, and supervision of office and stores, keeps the time of these officers fully occupied.

ASIATIC STAFF.—The Asiatic staff consists at present of Sanitary Inspector d'Souza, who is entirely concerned with anti-mosquito and rat-catching work, Sub-Assistant Surgeon Durgadas Soni, who is in sub-charge of the Port and Infectious Disease hospital, and of the Malay motor driver. The latter is employed mainly on repairs and adjustments, and is responsible for the motor transport. When not engaged on work of this nature, he is employed on repairs to refuse carts and equipment, minor plumbing, etc., and generally carries out work which is beyond the scope of the African carpenter.

AFRICAN STAFF.—The permanent African staff is nearly as large as we can efficiently control with the present supervisory staff.

CLERICAL STAFF.—The Clerical staff consists of one African clerk at Rs. 75 per month, and one headman at Rs. 25, impressed into office work by reason of his having been a typist in German times.

NATIVE SANITARY INSPECTORS.—The number of native Sanitary Inspectors allowed, viz., six, is insufficient to ensure the efficient inspection of the Indian and native quarters.

It is considered that the permanent establishment should be nine. This would allow one Inspector for each populous area, and would leave three large but sparsely populated areas to be visited by the mosquito clerks.

At present the removal of an inspector for special work holds up the routine to an undesirable extent.

5. SANITARY TRAINING CENTRE

It is hoped that the scheme for the formation of a central training depôt for inspectors at Dar-es-Salaam will go through. This appears to be the only way of ultimately obtaining an efficient service.

A certain proportion of the native Sanitary Inspectors are on probation, undergoing training in Dar-es-Salaam. A school of sanitation is being attempted, where native Africans, able to read and write, either in English or Swahili, may undergo a systematic course of instruction in Sanitation. At the conclusion of the course it is proposed to distribute the probationers to out-stations. But the greatest difficulty has been experienced in obtaining the right class of native. In three or four instances natives have completed an elementary course, and have been sent out to other stations only to turn out complete failures, when removed from close supervision. It is more than technical training that is required. It is a sense of responsibility that has to be inculcated and it is there that, up to the present, we have failed. The coast Swahili is extraordinarily receptive to teaching, and so far as can be ascertained whilst at headquarters, appears to take a real interest in his work, but once he gets away he is apt to abuse his position or else become lazy. It is to be hoped, however, that in the future we may be able to recruit from natives who have attended school, where, in addition to other things, they have learnt the meaning of discipline.

Meanwhile, we are compelled to look to the Nyasaland native, who is perhaps more intelligent, and in a number of instances has already received some training at a mission.

6. MAJOR WORKS

The following is a summary of sanitary works that appear urgently necessary :—

(*a*) *A pure water supply.*—Here we have a township of about 20,000 inhabitants dependent on surface wells. The supply is as precarious as it is unsafe.

Any scheme for an elaborate pure water supply is likely to be extremely costly owing to the rise in the price of material and freights. A rough estimate might place the cost at somewhere near £100,000. Such a sum is unlikely to be found out of revenue for some time to come. The main technical difficulty is that there is no adequate pure supply available near the town. So far as we have been able to ascertain, the nearest spot at which water can be tapped, is in the neighbourhood of the Pugu Hills—say ten or twelve miles away.

Meanwhile, a small proportion of the European houses are on a piped supply pumped from bore holes running to a considerable depth. Even this water, although it is pure, is semi-brackish, contains a high chlorine content and is moderately hard. But the larger number of houses in the official and European residential area rely on water hand-pumped from the garden wells. There exists not one such well that is not in the closest proximity to the house cesspit, and the Sanitation Branch is not aware of a single sample having been pronounced potable, whilst from many of them water is obtained that is hardly fit to wash in.

The drainage of the Gerazani Valley, however, to which reference is made later in this report, has produced a channelled water supply amounting at present to a daily yield of not less than 250,000 gallons. When the drainage of the valley has been completed, this amount in all probability will be increased to nearly half a million gallons a day. The question is now under the joint consideration of the Public Works Department, the Health Department and the Director of Laboratories as to whether after purification by bleaching powder, this supply can be made use of. One difficulty, however, lies in the fact that a spore-bearing organism, indicative either of animal or human contamination, has been recovered, and this organism resists sterilisation by chlorine. It seems, however, that if we are enabled to overcome this difficulty, either by efficiently and effectively screening the sources of supply or protecting the channel, or both, that we actually have at our very door an available supply, the tapping of which would relatively be a cheap affair. Further work is in progress on this problem at the moment.

(*b*) *Street drainage.*—No general scheme has been considered yet. The finding of the German plans should hasten the work, which is of the first importance, having regard to the pollution of wells and ground which is going on as a result of the ubiquitous porous cesspits.

Work is being constantly carried out on the temporary system at present in use. But until all the main drains and street gullies are properly laid and cemented, we cannot hope for very satisfactory results. The first heavy shower breaks away the walls of the temporary ditches and at once obstructs the flow of water.

(*c*) *Gerazani culvert.*—The new culvert, with a tidal valve is now working well.

(*d*) *Additional drainage questions.*—Barracks drains : these are now in working order, but will need ultimate reconstruction.

Bagamoyo street drain : a new drain has been run down this street to take away storm water and sullage water.

Repair of foreshore culverts : the longer this is put off the more expensive it is likely to become.

Reconstruction of the tidal valve at old European Cemetery : the substitution of an iron sluice gate for the existing wooden one is needed. Some method of excluding the sea must be found, since numberless collections of culex larvæ have been found in the crab holes, due to the flooding by the sea ; and Dr. Aders, of Zanzibar, states that anophelines have been found to breed in similar holes, though this has not yet been verified in our case. At any rate the holes account in part for the plague of culex mosquitoes in the vicinity. This causes great annoyance at the European hospital near by.

Dockyard drains: the surface drains at the dockyard, which are an almost constant source of anopheline larvæ, owing to the springs, which constantly discharge fresh water from the cliffs behind, need regrading.

7. MINOR WORKS

(*a*) *Public latrines.*—These are all unsatisfactory. It has been pointed out that cement floors and reconstruction and painting on most of the buildings is necessary. It must be remembered that these latrines were put up during the military occupation, and had to accommodate far more users than is the case now. Similar and a more permanent type of latrine is required.

(*b*) *Latrines for house boys.*—No European house should be erected in future without a water carriage latrine for the use of house boys. The advantages of such an arrangement over the present system are obvious.

(*c*) *Washing facilities for clothes.*—The construction of washing places in connection with soakage pits at all officials' houses is being steadily proceeded with.

(*d*) *New W.C. pans.*—These are not yet available, and are badly needed in many of the officials' quarters.

(*e*) *Gulley traps.*—The German bathroom system may be condemned *in toto.* The obsolete bell traps installed therein account for all the complaints of bad smells which are received with regard to bathrooms.

(*f*) *Ventilation shafts for cesspits.*—These are universally necessary, but sufficient stocks are not yet available.

(*g*) *Flushing cisterns.*—Many of these are worn out, and should be replaced as soon as more are available.

(*h*) *Removal of rainwater gutters.*—This plan has been steadily proceeded with; the removal of this fertile source of nuisance brings disfavour on the Health Office, but the benefits are appreciable. If rainwater must be collected, let it be done in underground tanks *via* cement gutters on the ground level.

8. DISPOSAL OF REFUSE

The present plan is to cart all, or as much as possible, of the municipal refuse to the railway sleeper-pattern incinerators at Chafu Koga. The ash is used for filling-up purposes. This plan works well enough in the dry season, though the smoke and smell nuisance in the neighbourhood is almost intolerable. In the rains the whole system breaks down and a great part of the rubbish has to be dumped, untreated. The supply of flies is in consequence unlimited. The question of the purchase of a good forced draught Destructor, on the Horsfall pattern, is under consideration.

The twelve ox-carts, with which the Health Office has to clear the town's refuse, are barely sufficient in dry weather to clear away ordinary house refuse. In wet weather, when the refuse is sodden, the number is nothing like adequate. And further, in order to remove the grass and bush cut by the convicts and other gangs, some of these carts have to be taken off their proper work in the afternoon, consequently the removal of refuse from the native quarter is apt to be neglected.

The use of motor transport for this work of removing bush and grass is almost imperative. Burning the grass *in situ* has been tried, but was found to leave unsightly heaps of ash and half-burnt greenwood which had to be removed later.

Moreover, the grass forms useful fuel for the incinerators, and saves the provision of more expensive material. If it is decided that motor transport cannot be provided, more ox-carts will have to be obtained, if the town is to be kept in a clean and tidy condition.

During the months of July, August and September, of 1920, the accumulation of rubbish in the town became actually greater than could possibly be handled by the transport at our disposal. A further dozen oxen had to be purchased at a cost of Rs.1,800 in order to relieve the already overworked beasts. Had four re-conditioned box Fords been purchased in their stead at the same price the work of refuse removal would have been considerably lightened and more efficiently carried out, though the maintenance cost would probably have been somewhat, though not very much, higher.

9. MARKETS

The native markets in the centre of the town are under the control of the District Political Officer. From 1st November the District Political Officer has consented to hand over the market labour to the Health Department, as the arrangement whereby one department cleaned the streets around the markets, and another the inside of the building, was working badly, as might be expected.

The existing markets are a standing disgrace to the township. Accommodation is limited. They are overcrowded. The flooring is all broken up. The water supply is insufficient to cleanse the place out. There is no protection for the storage of foodstuffs or protection of meat from flies. The market place itself is situated in a densely crowded, congested, and generally dirty part of the town.

It is understood that the proposal to make use of the large shed at the Carrier Corps depôt has the approval of the Administration, in which case the sooner the move is completed the better for the health of the town.

10. HOUSING

The housing problem, not only as regards accommodation for officials but for all classes of the community, is as acute in Dar-es-Salaam as it appears to be in every other country. Taken all round, it may be said that the officials in the capital are well-housed. It may be that the houses, as built under the German regime, are not such as would be designed by English architects. But nothing good can be said for the flat-system in a tropical town where room is available for detached houses. The actual saving in cost appears to be so little as to offer no advantage when the disadvantages are considered. For instance, under the flat-system, from the sanitarian standpoint, there are difficulties over kitchen and water-closet accommodation. There is divided responsibility for the upkeep and maintenance of the compound. There is possible irritation on the part of one tenant over another tenant's lack of consideration, or on account of the noise of children or music above or below him. In extenuation, the nervous system of those who live in the tropics, it must be remembered, is frequently not so stable as in England. Irritability leads to depression and the sufferer is less able to put in a good day's work. It is sincerely hoped that no project for the future building of houses on the flat-system for married officers will be allowed.

The Colonial Office Committee condemned it, and there appears no good reason why such a considered opinion should be opposed by the local building or housing Authority.

It is understood that a considerable building proposal is being put forward for next year. The plans for these houses have not been seen by the Senior Sanitation Officer as other arrangements for the representation of the Sanitation Branch on the Housing Committee have been made. There has not been the smallest effort on the part of the Housing Committee since Dr. Scott went on leave to co-operate with the Health Department. Instances have occurred where houses have been allotted to officials only to be condemned later on by the Acting Medical Officer of Health on sanitary grounds as unfit for residence. Had the Health Officer been represented on the Committee such lamentable inco-ordination might conceivably have been avoided.

11. TOWN PLANNING

The Central Building and Town Planning Committee on which the Sanitation Branch is represented meets weekly to consider building applications. The general principles determining their decision as regards Dar-es-Salaam may be summarised as follows :—

1. An area is to be set apart as an European residential quarter.
2. An area about 300 yards wide has been marked down as a neutral zone in which no building will be permitted and within the limits of which it is hoped, in course of time, to demolish existing huts and shanties. To the east of this neutral zone no native hut will be allowed to stand. Plots and blocks have been laid out to the

west of the zone where native huts may be erected subject to certain conditions as regards the ratio of the size of the hut to the plot, to distance from the next hut and to alignment.

3. The Building Committee are resolved to permit no building to be erected within certain limits that does not conform to an European Sanitary Standard.
4. The provision of open spaces in the more overcrowded and congested areas of the Indian quarter is kept in view.
5. The whole question of Housing and Town Planning requires the most careful consideration. To begin with, it is almost inconceivable that even in the near future, Dar-es-Salaam will remain the seat of Government, at any rate all the year round, when up-country sites are to be found with a climate that an European can stand for much longer periods of service. There are few more tragic scenes than a deserted capital presents. One only needs to visit Massawah to see the mistake the Italians made in their early colonial efforts.

12. INCIDENCE AND PREVALENCE OF DISEASE IN THE TOWNSHIP

(*a*). *Malaria.*—According to Captain Pomeroy, R.A.M.C., in 1917, the percentage of troops in Dar-es-Salaam suffering from malaria was very heavy, especially in the main detail camp at Gerazani, and the Prisoners of War camp. The latter was located near the northern arm of the Gerazani swamp. European Officers seldom lasted more than three weeks. In 1917, Pomeroy says that 70 per cent. of the troops of some units were down with malaria.

Owing to various circumstances, beyond the control of the Sanitation Branch, complete figures for the year 1919 are not available, but the following table shows the number of cases of malaria treated at the European general hospital.

Year 1920	Europeans		All other Nationalities	
	Cases	Deaths	Cases	Deaths
January	11	1	11	—
February	9	—	4	—
March	18	—	7	—
April	16	—	10	—
May	27	—	22	—
June	15	—	13	—
July	18	1	19	—
August	—	—	—	—
September	—	—	—	—
October	—	—	—	—

All cases of malaria admitted to the general hospital are notified to the Health Department and a "spot map" maintained. In the result, this map indicates the chief danger zones. As would be expected, those living in houses near the Gerazani swamp appear to suffer out of proportion to those who live in the European residential area. It is suggested that the incidence of malaria attacks among native officials would be diminished if quinine were taken prophylactically. A plan that worked well in Zanzibar in pre-war days was for a representative of the Health Department to go round the Government offices with a solution of quinine twice a week on two consecutive days. All clerks were invited to take quinine. It was not compulsory but any official admitted to hospital for malaria, whose name did not appear on the quinine roll, lost his pay whilst away from work, as it was regarded that the patient had not taken all possible steps to keep himself effective. It is not so much the new cases that deplete Government offices of their clerical staff, as relapse cases. There is no shadow of doubt that unless a malarial subject undergoes anti-relapse treatment he is extremely likely to suffer from relapse after relapse.

(*b*) *Blackwater.*—In Dar-es-Salaam this disease appears to be relatively rare. The cases reported as having come under treatment at the European Hospital are as follows :—

Year 1920	Europeans		All other Nationalities	
	Cases	Deaths	Cases	Deaths
January	5	1	—	—
February	1	—	—	—
March	—	—	2	—
April	—	—	1	—
July	2	—	—	—
August	—	—	—	—
September	—	—	—	—
October	—	—	—	—

(*c*) *Infectious diseases. Intestinal.*—Between January and July, the following number of cases came under treatment at the European hospital :—

	Cases.	Deaths.
Dysentery bacillary	2	—
Dysentery amoebic	9	—
Enteric	9	—

In regard to the cases of enteric the source of infection could not be traced. The cases occurred at intervals in various parts of the town. The geographical distribution of these suggested a carrier case at one of the dairies. The class from which the cases came was such that carelessness in not boiling the milk before consumption might be expected.

Only one of the cases occurred in a European official. The epidemic, if such it can be called, was confined to the months of May and June and accounted for seven of the nine cases.

The Infectious Disease hospital has had few admissions during the year. In July, one case of small-pox and three contacts were admitted ; in August, one case of chicken-pox ; and in September, three cases of the same disease with nine contacts.

A native of Mauritius, suffering from leprosy, has been accommodated at the hospital since the beginning of the year. He was in Belgian employment at Kigoma, and on his disease becoming known, he was sent down to Dar-es-Salaam for repatriation. No steamer, however, would give him a passage, and he is now awaiting the advent of the North-East monsoon, when it is hoped that passage by dhow may be arranged for him.

13. ANTI-MALARIA MEASURES IN DAR-ES-SALAAM

Before undertaking any measure it is necessary to have an accurate knowledge of all the breeding places for the anopheline mosquito. The previous work of Dr. Orenstein, Colonel Clemensha, Captain Pomeroy, Captain Lamborn, and Dr. Scott has put us in possession of practically all the information we need.

The town of Dar-es-Salaam though rather low-lying, is itself not swampy, but at the back of the town the country is broken up by ravines. The upper soil is extremely porous but it rests on a bed of clay; the consequence is that the edges of the ravines "weep," and such swamps as exist are found in the valleys between the cliff sides. There are two of these valleys—the Gerazani and the Msimbasi.

On the outskirts of the township to the western side is a saucer-shaped depression, the Bagamoyo pool. There is a small swamp area west of Upanga street, and another near the north end of Leue street.

These areas are, practically speaking, the only constant anopheline breeding places near the town, the valleys naturally being the more difficult to deal with.

For the time, all that is necessary has been done to the Bagamoyo pool. Its bank has been trimmed and cleared of all vegetation, and it has been wired in. A small area has been left from which water for domestic purposes (washing and so on) can be drawn. This prevents the formation of footmarks in the soft mud all around the pool. It was found formerly that such small holes in the ground favoured mosquito breeding. The pool itself is stocked with larvacious fish. A drain leads from the pool to the sea, so that in the wet season the "saucer" cannot be flooded, It is impossible and probably undesirable to empty the pool, because, as it is at present it acts as a "sump" and actually drains the entire neighbourhood.

The small swamp west of Upanga street in course of time will be filled up. A drain leads from it to the sea and it is only a question of raising the level of the land on each side for it to dry up completely. This is what is being done at the moment.

The principal drainage work during the past year has been done on the Gerazani swamp. This has been a constant site for anopheline breeding. Starting from the creek, the Gerazani valley runs south for about 1,700 yards. For the first thousand yards of its course it is about 300 yards wide, after which it narrows considerably. The fall from its southernmost point is only 3 in 1,000. Along the valley formerly meandered a broad sluggish stream. About 1,300 yards from the creek edge, an arm of the narrowing valley turns north and west and continues for another 1,500 yards when it ends abruptly. At both the northern and southern upper ends, the whole valley is thickly cultivated with sugar cane. Cane requires almost unlimited water, consequently the practice is to grow it in raised beds and arrange for water to remain in between each bed. From the sea end to a thousand yards inland cane cannot be grown on account of the salt in the soil, but sweet potato grows well. To get a crop of potato the same form of bed is necessary with an ample supply of water. The floor of the valley is by no means level, there are hollows in all sorts of unexpected places. In the hollows water lies even in the driest season. On account of the coarse green grass they cannot be readily seen.

It has been obvious to every sanitary authority, German, British military, and to the present Administration, that if the incidence of malaria is to be lowered in Dar-es-Salaam the drainage of the Gerazani swamp must be tackled. The Germans started by more or less clearing the existing stream and depended on that to improve the drainage condition. The military Sanitary Authority "feather stitched" the swamps, joining the side drains up to the central stream. But matters were only slightly improved. The only way to drain the valley properly and thoroughly is (1) either to arrange to get a better fall or (2) to fill it up in such a way that a fall can be obtained everywhere to the central stream. We decided to do both. The Public Works Department effectively dammed the sea from coming into the creek by means of a tidal valve allowing the accumulated stream water to leave the creek at low tide. That has given an additional fall of roughly two feet. The low-lying land near the creek was next tackled, and after ploughing it up in order to rot the coarse vegetation, it has been filled up and levelled so that there is a very slight fall to the central stream. Next a straight trench was cut from the creek to the southernmost point of the valley and the surrounding land drained by "feather stitching." Sugar cane has been cut, the cane beds levelled ; sweet potatoes dug up and beds levelled ; all coarse vegetation removed and the land thoroughly reclaimed. Owners of cane beds have been warned that they will not be allowed to grow cane again. The land will take a mealie crop perfectly well and if they desire to cultivate anything they must cultivate that or matama.

At the time of writing, the whole valley including a shorter south-eastern arm is dry and drained and it is hoped that by the end of the year the north-western continuation of the valley will have been dealt with in a similar manner.

With the labour and the funds available it has been found possible each month to dig 1,500 yards of satisfactory trenching and to dump nearly 1,000 tons of soil into the hollow places. The cost of this work runs to Rs.1,200 a month, and it will have been completed in four months. (It may be mentioned that the reclaimed land, where it is "No man's land," has been sown with mealie. It is already showing and if the crop obtained is as heavy as is expected, a good deal, if not the whole cost of the works on the swamps may ultimately be recovered.)

The result of all this is that where only a short time ago the passage of the valley was impossible, where there was mud and swamp and water up to or above a man's knee, now is dry ground. Here and there, but only in side drains, are anophelines found breeding. Formerly their breeding places were in myriads. There is no reason why in the future, when the present system of open channels has been replaced by closed agricultural drain piping, the Gerazani swamp and the Gerazani valley should not be entirely free from mosquitoes of all kinds.

When that work is completed, half the campaign against malaria in Dar-es-Salaam has been got through.

The problem confronting one in the Msimbasi is similar and it can be overcome by the same means. It is hoped to tackle this next year. A start will be made at its upper end, cane beds will be cut and levelled, hollows filled in, the stream properly channelled to run dead straight to the sea. It is a better soil in this area and there is nothing to prevent, after drainage, satisfactory mealie crops being obtained. The work should be completed within a year at a cost of about £1,400.

Are these rather elaborate measures likely to reduce the incidence of malaria? The view of the Sanitation Branch is that the malaria sick rate will be greatly reduced. This opinion is confirmed by a quotation from a report made by Dr. Orenstein, who was Health Officer in Dar-es-Salaam, previous to the war. This officer had formerly been in the employ of the American Government and had been one of Surgeon-General Gorgas' assistants during the construction of the Panama Canal. His opinion, therefore, is of weight. Orenstein says—"I want to express my absolute conviction that Dar-es-Salaam can be made healthy. Malaria can be eradicated more easily than in Panama."

TANGA TOWNSHIP

1. REVIEW

Civil Sanitation effort started at Tanga when, on 6th June, 1917, Dr. Keigwin was appointed Medical Officer of Health to that town.

In the German days Tanga had a population of some 9,500, including 250 Europeans. Dr. Keigwin directed his main efforts to restoring the town of Tanga to its pre-war sanitary condition, particularly directing his attention to anti-malarial measures.

For some reason or other Tanga appears to have been in pre-war times a more malarial spot than Dar-es-Salaam. A malarial index was ascertained in the two towns in 1910, 1911 and 1912, when the percentage of malaria carriers was found to be :—

Year	Dar-es-Salaam	Tanga
1910	18	33
1911	17	53
1912	20	77

The total examinations made were, in Dar-es-Salaam 61,000, and in Tanga 34,000.

A further task confronting Dr. Keigwin was to prevent Tanga becoming infected by Plague from Mombasa.

His staff consisted in the first instance, in addition to himself, of one young Indian under training as a Sanitary Inspector, 1 headman, and 14 labourers.

In November, 1917, a second Indian was taken on as an Inspector, and sanitary control over the native quarter of Ngamiana was assumed.

In January, 1918, the sanitation of the railway area was taken over, only to be handed back again to the railway Authorities later on. It remained thereafter incumbent on the railway to look after the sanitation of its own area, until 1st August, 1920, when their work again came in the province of the Health Officer.

In February, 1918, the military sanitary detachment was removed and, at this date, the Health Officer had at his disposal 85 general labourers.

In August, 1918, Captain Tothill was detailed as Assistant Medical Officer of Health, and a systematic vaccination crusade was entered upon throughout the township.

In October, 1918, the efforts of the Sanitation Authority were largely occupied with endeavouring to check the ravages of influenza, and their efforts appear to have been highly successful, for the town escaped very lightly in comparison with others. Altogether only 208 cases with 12 deaths were reported. By the end of November the epidemic was reported as over.

Dr. Tothill assumed duties as Medical Officer of Health on the 3rd January, 1919, and remained in charge until relieved by Dr. Haworth, in July, 1920.

2. SMALL-POX

Between November, 1919, and February, 1920, the district of Tanga was visited by an epidemic of small-pox. It appears to have come into Tanga by an infected family arriving at the port by dhow. There were 13 cases with 2 deaths in the town. By January, 1920, it had receded from the town. The disease went on southwards, by dhow, to Pangani; then north and west by road, appearing at Mkozi, Muheza and Tangeni, south of the Tanga Railway; and at Mososwe, north of the line.

3. MALARIA

The chief problems with which the sanitarian comes face to face at Tanga are those common to other tropical towns where European, Indian, and African natives live relatively unsegregated together.

Tanga, roughly, may be divided into two areas, the stone town, in which are situated European residential and business houses, with Indian shops and stores, and, separated by the railway line, the native African town, Ngamiani. There is thus no natural obstacle to the ready infection by the European of insect-borne disease.

It has already been mentioned that the malarial index in Tanga, in 1912, was 77 per cent. As the carrier cannot very well be removed the vector must be attacked. This implies the drainage or filling up of swampy areas and rigid supervision on the part of the Health Department over all places where anophelines can hatch out. The complete drainage of the environs of Tanga appear to offer no insuperable obstacle. It is merely a question of funds and time practically to eradicate malaria from the European population.

4. ANCHYLOSTOMIASIS

In regard to natives the principal disease affecting life and health is Anchylostomiasis.

Hookworm disease has been reported as causing one-third of all deaths. Improved sanitation, especially as regards the provision of suitable latrines at convenient places, is however, undoubtedly reducing the figure. In addition to sanitary measures the actual treatment of patients on a more or less wholesale scale has a marked influence on the prevalence of this disease. It is recorded that so high a figure as 80 per cent. of all new patients admitted to hospital on examination were found to harbour hookworm, whereas, the last figures available show that the percentage had fallen to 20 per cent.

5. WATER-BORNE DISEASES

Water-borne disease among Europeans is relatively rare. This is to be ascribed to the fact that practically everyone is dependent on soda water, where, although the supply of water is derived from a deep-well source it is, nevertheless, filtered before boiling. Only three cases of the enteric group were recorded in 1919, two being in Europeans. The original source of infection, however, appears to have been up the line. Dysentery is uncommon.

6. WATER SUPPLY

Tanga relies for its water supply on deep wells. The Germans had a project of piping a supply from the Zigi River, some twelve miles away, but the project did not materialise. The question, however, of providing a piped water supply to Tanga will, sooner or later, have to be considered. The present source is not only precarious in dry weather, but is thoroughly dangerous. In Tanga, as in Dar-es-Salaam, the well in any compound is always in the closest proximity to the cesspit. What is taken out of the well finds its way back again by the shortest possible route.

7. STAFF

The present staff attached to the Health Office at Tanga consists of :—

Medical Officer of Health ...	1
European Sanitary Superintendent	1
Native Sanitary Inspectors ...	4
General labourers	64

SECTION III

RURAL SANITATION

1. GENERAL CONSIDERATIONS

The responsibility for the sanitation of the out-stations rests either on the executive Medical Officer at the station or, in his default, on the Sub-Assistant Surgeon or Compounder.

Native Sanitary Inspectors are maintained at Bukoba, Iringa, Lindi, Moshi, Tukuyu, and Lushoto.

At Mwanza an Indian, with a Sanitary Inspector's diploma, is stationed. The native Inspectors at Bukoba and Tukuyu are, in reality, camouflaged headmen.

At Tabora the Medical Officer in charge acts as Medical Officer of Health in addition to his other duties. As Tabora is probably the most unhealthy station in the country, as well as the town with the largest population, his work is no sinecure. He is assisted in his sanitary work by a European Sanitary Superintendent and two native Sub-Inspectors.

In regard to sanitary labour, practically all Administrative Headquarters are provided with funds from the Sanitation vote for the maintenance of a larger or smaller sanitation gang who are employed on street sweeping, market cleansing, grass and bush cutting, incineration of rubbish and so on.

2. CONDITION OF HEALTH AT OUT-STATIONS

In a vast country such as Tanganyika, with its widely varying conditions of climate, this is not a subject that is suitable to do more than touch upon in other than a special report. Broadly speaking there are three climatic zones affecting health :—

1. The costal zone, including the Rufiji Delta, in which the European is exposed to the debilitating influences of heat with a relative humidity. The danger of malaria infection is ever present.

2. The central plateau zone with an altitude of from 2,000 to 4,000 feet. Here malaria still continues to be the danger to

health, and, in addition to that, intestinal complaints appear to be commoner than on the coast.

3. The Highland zone, such as is found at Lushoto and other places at an altitude of around 6,000 feet. The mosquito seems to disappear at an altitude of 5,500 feet in these latitudes and, therefore, the malaria danger is passed.

These zones, it is suggested, deserve consideration in regard to the leave question, not only for the official world, but for commercial firms. As matters stand at present an official who is stationed in the Rufiji Delta is on a par as regards his leave privileges with his colleague in the " Winter Hochland " of the Usambara, or in the excellent climate of Tukuyu and other places.

3. INFECTIOUS DISEASES

(*a*) *Influenza.*—At the time of the armistice, influenza was pandemic. No useful purpose is served by attempting to give figures which are too unreliable. A possible index to its severity is afforded by a series taken from the Mombo-Masinde-Ikumbara area in the Usambara District. Here there were 584 cases with 14 deaths, that is a mortality of 2·3 per cent. of all cases. Dr. Tothill, reporting on this locality, recorded the unwillingness of sick to come into the temporary hospital. They were only too glad to have domiciliary treatment. Tribute must be made to the work of the Mission Sisters in grappling with the situation.

Another series from the Tanga District gives 530 cases with 14 deaths—a case mortality of 2·6 per cent.

A curious sporadic outbreak of influenza occurred in Tanga in June, 1920. There were 15 cases, 12 being amongst Europeans, but no deaths.

(*b*) *Plague.*—The whole territory has been free since its occupation by the British. This is a noteworthy fact in view of Mombasa, Kisumu and Jinja having been more or less heavily infected for some years past.

The Singidda District on the central plateau has been a source of anxiety. As far back as March, 1918, plague has been reported as present in that area. Cases of illness extraordinarily similar in symptomatology to plague continued to be reported from Singidda and Mbulu up to April, 1920. Several Medical Officers sent up to investigate the unusual mortality in the area, reported the cases as being, clinically, plague. Dr. Butler, Director of Laboratories, proceeded to Singidda in June, 1920, but was unable to obtain bacteriological confirmation. The disease, therefore, whatever it was, is not regarded as having been plague.

The vulnerable points in this territory are the ports of Dar-es-Salaam, Tanga, Mwanza.

Dar-es-Salaam is fortunately protected by the very efficient measures taken at Zanzibar against ships ex Mombasa. For instance, all holds opened at Mombasa are "Claytonised" at Zanzibar. All native passengers from Mombasa who have passed through that port must be inoculated. Swahili passengers on arrival here are isolated at the Quarantine Hospital for the prescribed period. Indians and others who are vouched for by a householder are placed under "surveillance" and report to the Health Office daily for inspection.

Tanga is in danger chiefly from the dhow traffic, but regulations have been put into force to safeguard that town from infection by imported rats. Mombasa dhows arriving at Tanga are obliged to lie out in open water, and no "careening" is allowed on the foreshore.

Mwanza is exposed to infection from Kisumu, Entebbe, and Jinja, where plague is sporadic. Strict rules are in force at Mwanza which, so far, have been efficient in keeping out infection.

(*c*) *Small-pox.*—Since 1917, at least, small-pox has been widely spread throughout the Territory. It may be regarded as an aftermath or legacy of the war. During the period of military occupation there was every facility for its spread. Carriers were recruited from every district, from every tribe and sub-tribe. There was constant traffic throughout the country.

The first available report comes from Lushoto in May, 1917. In spite of wholesale vaccinations (25,800 in that district alone with positive results in from 57 to 80 per cent. of cases) the disease spread widely. In June it was in Handeni, Moa and Tanga. Cases were reported along the Central Line in November and December. In February, 1918, it had got to Kasanga (Bismarckburg). In March it was found at Dodoma and Rufiji, and in June it was back in Sadani. The year 1919 was not characterised by any special outbreak beyond a moderately severe one in the Dondebosche area of the Mbulu sub-district.

Throughout the whole of this year small-pox appears to have been pandemic. The line of infection looked at from a broad point of view cannot be traced.

In January it is found in places as far apart as Mbulu (infection from Domdebosche) and at Mwanza (possible infection from Entebbe). In February it is reported at Newala (Lindi District), and in April and May at Shinyanga, Kilwa, Iringa. In May rather a severe outbreak occurred again along the line of the northern railway. It was reported from Muheza, Amani, spreading in June and July to Tangeni and Gombero, Pangani, Moa and Tanga itself. During these months the disease was also found in the Songea District (at Lipumba) ; there is a recurrence at Mbulu ; it is at Taveta and in the Iringa District. In June a serious epidemic started in the Musoma country which has persisted until the date of writing this report. From here the disease spread as far as Bukoba *via* Mwanza, and from Mwanza southwards down the road to Shinyanga, again. From Bukoba the infection appears to have spread through the Ruanda country under Belgian Administration until it reached Kigoma in September. In August reports of it were received from Taveta, Lipumba, and the Tanga District again suffered terribly. In September it delayed the embarkation of certain Germans awaiting repatriation at Tanga as they brought a case with them from the Moshi District, and a second developed during the quarantine period. During this month, and in October, it continued to claim a number of victims in the Musoma District, and in October it broke out again at Taveta and in the Lindi District. This rough geographical description gives an idea of the very wide distribution of the disease.

It may well be asked how it is that vaccination does not give greater protection. It might be thought that by now the greater part of the population must have actually suffered from small-pox. In fact, among some tribes, it is reported that not less than 60 per cent. have suffered. The answer is not readily given. The same phenomenon is occurring in other parts of the world. But what we do know in this territory is that our vaccine lymph is not giving the number of positive results that should be expected. We employ three varieties of lymph.

1. Dried vaccine obtained from Nairobi.
2. A lanolinated vaccine lymph.
3. A glycerinated vaccine lymph.

The most reliable appears to be the lanolinated, and the least, the dried variety. But even then positive results are only obtained in from 7 to 20 per cent.

It is suggested that the world pandemic of small pox is possibly due to an altered strain or that the strain of the virus in this country is different in type from (*a*) the European (*b*) the Indian. Such an eminent authority as Colonel King, I.M.S., is of opinion that small-pox to-day is recognisable as of two types, two strains and one sub-strain. Without entering further into the technicalities of such a hypothesis it is evident that the progress of sanitary science in its efforts to prevent small-pox is, for the moment, checked.

Another difficulty is the maintenance of the activity of vaccine. The curve of activity of lymph exposed to changes of temperature falls very sharply after it has been removed from its storage temperature. When it is considered that it takes nearly three weeks to get a supply to far out-stations, it is not surprising that its efficacy has markedly diminished by the time it arrives, even if we did happen to have the right strain. All sorts of experiments in transport and storage have been made, so far with very poor results.

Future proposals may be touched upon at this stage. It is suggested training a staff of vaccinators for out-stations to go out into the Districts and endeavour to procure almost universal vaccination. There is little or no general objection on the part of the native to vaccination. On the contrary he fears small-pox and is only too ready to make use of anything which he may think as likely to protect him. If only we could get the greater number of children vaccinated we should be on a much stronger position to combat the spread of infection, and that in the near future is the aim of the Sanitation Branch.

(*d*) *Anchylostomiasis.*—This disease appears from reports to be confined principally to the country between Moshi and Tanga. It is a disease of the plantations or of communities, herded together, with indifferent latrine accommodation. In Swahili the disease is known as Safura. So common formerly was the disease that in August, 1917, the then Principal Medical Officer found it necessary to send a circular round in Swahili to all Akidas in the Pangani, Bagamoyo, Arusha, Moshi, Wilhelmstal, Mwanza and Kondoa-Irangi Districts, explaining the cause of the disease and suggesting means for arresting its spread.

The German authorities recorded that among the Usambara plantation population the percentage of infection amounted to 70-80 per cent. Their campaign against the disease was interrupted by the war and it is suspected that the infection rate percentage to-day is not much lower than it was in former times.

Not only is anchylostomiasis *per se* a fatal disease but it produces debility such that the infected person is more liable to death from inter-current affections than if he were non-infected. As noted in the remarks on the Sanitation of Tanga—it is to be presumed that it is the cause of one-third of all deaths in those districts where it is especially prevalent.

The prevention of the disease presents no special difficulties. As the country, especially the plantations areas in the Usambara, once more gets opened up, estate owners and managers must be made to provide adequate latrine accommodation for their labour, whilst groups of estates will probably find it to their advantage to employ a special Medical Officer to investigate its prevalence among their labour personnel and to place sufferers under proper treatment. In course of time labour will probably become scarce and estate owners in their own interest will find it necessary to undertake preventive measures, although in the first instance they may have to be made to do so by Government Regulations.

It is a disease that in townships with even an effort at sanitation will largely disappear. The provision of properly maintained public latrines is *the* measure. This applies also to wayside stations on the railway. The habit of native travellers making use of the bush in the neighbourhood of a station must be firmly put down ; but until all stations are provided with latrines this cannot be expected.

In regard to the possibilities of cure under treatment the following figures are to be quoted :—

CASES TREATED AT MKUNAZINI MISSION HOSPITAL

	1916.	1917.
Patients examined	365	365
„ Infected	319	306
Percentage infected ...	87·5%	84·0%
*Cured after 12 treatments ...	98·4%	98·8%
Found incurable	1·6%	1·2%

* NOTE.—80 grains of thymol or betanaphthol on three successive days—four days interval—examinations—repeated if still infected.

(*e*) *Tick Fever.*—The exact distribution of this disease in the Territory has not yet been actually defined. It is known to be widely spread throughout the Mwanza and Musoma Districts and has been reported from Mkalama, Shinyanga, and Tabora.

The King's African Rifles detachment at Mwanza has suffered fairly severely. This was possibly due to the influx of non-immune recruits from Nyassaland and the same applies to the battalion stationed at Tabora.

The jail and the boma at Mkalama are both infected with the vector of the disease, *Ornithodorus moubata.* It may be assumed that pretty well every camp on the Tukuyu-Songea-Tabora-Shinyanga-Mwanza road is tick infected.

The remedy in mass prevention as far as native soldiers and policemen are concerned lies (1) in not sending non-immune men to tick infested barracks and (2) if this is not possible to construct quarters of the simplest materials for askaris—that is to say quarters made of galvanised iron sheeting on a cement concrete floor with galvanised iron roofing. No better pattern of barracks it is thought can be found than those at Kurasini in Dar-es-Salaam.

(*f*) *Malaria.*—The following table shewing the number of cases treated either as out-patients or admitted to hospital gives some idea of the relative prevalence of Malaria in various out-stations. No true comparison can be made, as from the information that is available ratios per thousand of population cannot be worked out. But if the number of cases under the column of native officials is studied, an index is obtainable. Take three of the smaller stations, for example, Arusha, Bagamoyo, and Kondoa-Irangi, these are comparable: the treatment ratio at these places for native officials is 2-7-2. Take again Dar-es-Salaam, Tanga and Tabora: the ratio is 4-12-105. It is admitted that the ratios are not statistically comparable and only very general inferences can be drawn, but it appears to be outstanding that Tabora is one of the unhealthiest spots in the country. The incidence of Blackwater fever, which has been defined as "an expression of the intensity of Malaria" bears this out. Ten cases in four months with five deaths almost puts Tabora on a level with some of the more notorious unhealthy places on the West Coast of Africa.

CASES OF MALARIA TREATED BY GOVERNMENT MEDICAL OFFICERS, APRIL–JULY, 1920

Station	April	May	June	July	Approx. Altitude
Arusha	2	1	20	62	4,000
Bagamoyo ...	—	—	71	99	Sea level.
Bukoba	—	—	11	196	3,700
Dodoma	1	2	38	24	3,400
Kondoa-Irangi ...	1	—	26	17	4,230
Kasanga	—	—	—	138	2,600
Lindi	2	2	67	9	Sea level.
Moshi	—	—	4	1,407	2,500
Mwanza	9	—	180	82	3,700
Morogoro ...	—	—	—	15	1,600
Rufiji	—	—	—	6	Approx. Sea level.
Songea	—	—	—	36	3,400
Shinyanga ...	—	—	—	27	3,800
Tabora	53	19	1,056	57	3,600
Tanga	31	27	124	65	Sea level.
Tukuyu	—	—	—	63	3,650
Wilhelmstal ...	—	—	—	144	5,500
	By Com	parison.			
Dar-es-Salaam ...	47	29	43	Figures not available.	

CASES OF BLACKWATER TREATED BY GOVERNMENT MEDICAL OFFICERS, APRIL–JULY, 1920

Station	Cases	Deaths
Arusha	2	1
Dodoma	1	1
Mwanza	1	—
Morogoro	1	1
Tabora	10	5 (2 Europeans).
By Comparison		
Dar-es-Salaam	2	—

(*g*) *Cerebro-Spinal Meningitis.* — Since February, 1918, the Territory has been practically free from the disease. An epidemic was reported from the Bukoba District in October, 1917, which persisted until early in 1918. In February of that year over 200 deaths were reported from the Bukoba-Karagwe area.

It is next heard of from Moshi in March, 1920, and one case was reported from that station in August.

4. SANITATION OF THE RAILWAY SYSTEM

At the request of the General Manager of the Tanganyika Territory railways, responsibility for sanitary supervision of the railway stations and passenger service on the Northern and Central lines was reassumed between August and September, 1920, and by arrangement the whole Railway Sanitary personnel reverted to the direction of the Health Department. On the Central line the work is supervised as follows :—

> The Medical Officer of Health, Dar-es-Salaam, is responsible for the sanitation of the line as far as Morogoro.
>
> The Medical Officer, Morogoro, carries it on to Dodoma, and the Medical Officer, Tabora, from Tabora to Dodoma.

In Dar-es-Salaam, there is one European Sanitary Superintendent with a gang of 25 labourers; at Morogoro, one Native Sanitary Inspector with 15 labourers; at Dodoma, 12 labourers, and at Tabora, one Indian Sanitary Inspector and 25 labourers. The Medical Officer, Moshi, supervises the work at Moshi and he has 15 labourers to work under him.

No arrangements have yet been made for the Moshi-Taveta section. On the Central Line the sanitary arrangements on all the mail trains are inspected before the train leaves.

D. S SKELTON,
S.S.O.

8th November, 1920.

SUMMARY OF SANITARY WORK IN DAR-ES-SALAAM TOWNSHIP

	January.	February	March.	April.	May.	June.	July.	August.	September.	October.
Larvæ Index	14·8	12·2	6·8	10·3	·9	5·2	4·0	3·1	2·7	2·6
Nuisances	—	406	321	367	831	729	716	244	269	602
Drains (inspected)	955	1,719	3,469	4,228	5,210	5,588	6,150	5,261	3,562	5,061
(oiled)	410	345	272	298	359	300	305	148	240	384
Cesspits and Soakage Pits (inspected) ...	2,228	2.356	3,988	5,876	7,523	8,521	11,561	7,915	6,839	11,397
(oiled)	126	85	103	139	217	240	448	611	664	901
Pools (inspected)	269	216	223	956	1,527	414	233	268	216	410
(oiled)	77	32	53	444	570	214	126	103	123	279
Wells (inspected)	1.302	1.358	1,443	2,162	2,916	3,099	3,389	2,402	1,867	2,000
(oiled)	199	213	367	439	1,055	378	341	424	387	340
Tanks and Barrels (inspected)	2,032	2,982	10,483	18,640	24,876	27,925	28,338	25,487	22.766	25,317
(oiled)	54	42	41	57	71	51	28	47	47	74
Existing Drains cleaned... ... ... Ft.	164,221	155,032	164,939	133,764	269,180	146,736	158,476	140,647	137,319	114,189
New Drains cut ... ... Ft.	—	—	—	5,427	819	—	1,026	168	3,089	5,046
Grass Cutting ... ... Sq. Yds.	75,276	84,798	54.910	6,639	9,507	2,800	10,400	66,000	107,040	18,780
Pits and Excavations filled	40	31	88	106	122	78	52	18	73	599
Collections of Fly Maggots found	9	28	39	18	39	107	62	12	7	123
Native Latrines ordered to be dug	74	69	66	68	128	83	104	49	405	487
Cart loads of Refuse removed	2,029	1,797	1,837	1,852	1,588	1,567	1,670	1,333	1,611	1,794
Dumps of Rubbish removed	—	—	76	39	150	72	27	147	158	—
Notices Served (Nuisances)	136	138	1	143	154	152	—	139	56	85
(Mosquito Larvæ)	106	26	48	85	94	15	30	5	—	—
Prosecutions	5	1	4	2	—	—	1	—	—	—
Infectious Diseases notified	5	1	—	—	—	E. Fever	6	1	3	17
Loads of Cess removed, Government Houses	69	105	92	89	65	88	104	93	113	100
,, ,, ,, Non-Government ,,	34	38	60	70	91	53	53	38	53	36
No. of Ships visited	17	9	13	19	18	16	12	13	15	12
,, Dhows visited	47	47	42	37	38	38	49	42	85	73
Prisoner Working Party...	—	1,022	833	1,069	1,260	1,045	1,524	1,299	1,178	1,122
,, Average per working day	—	46·4	33·5	44·5	53·6	43·5	56·44	41·9	45·0	41·5

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